

# PATENT ABSTRACTS OF JAPAN

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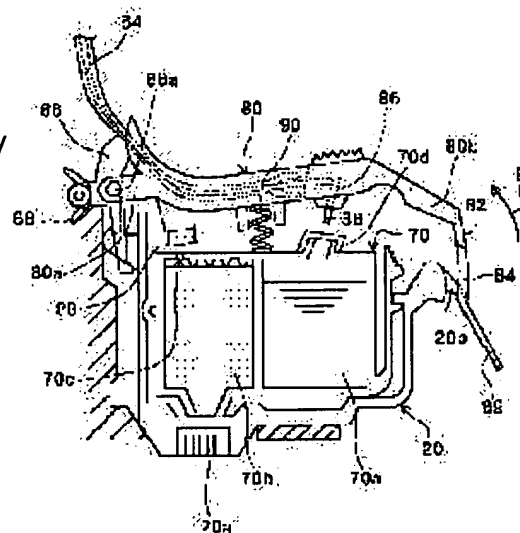
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## (54) INK-JET TYPE IMAGE FORMATION DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an ink-jet type image formation device, which can do switching to an 'ink runout mode' easily and securely.

**SOLUTION:** In changing a first ink supply mode to a second ink supply mode, a lever 89 is pulled up, a lock nail 20b is removed from a hooking hole 82, and the lock nail 20b is hooked to a hooking hole 84. By this, a joint needle 86 gets off from a joint shield 70d and leaves a fresh ink room 70a of an ink cartridge 70. Further, in the second ink supply mode, a seal material 88 closing a hole 70c also leaves from the hole 70c and a state of airtight of a sponge room 70b is canceled, and the sponge room 70b communicates with the outside.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The carriage which reciprocates to a predetermined main scanning direction, and the 1st ink stores dept. which is arranged in a different location from this carriage, and stores ink, The 2nd ink stores dept. which stores the ink with which the print head carried in said carriage is equipped, and which is supplied to this print head, It has the tube along which the ink supplied to said 2nd ink stores dept. from said 1st ink stores dept. passes. The 1st ink supply mode which supplies ink to said print head via said 2nd ink stores dept. from said 1st ink stores dept., And it sets to the ink jet method image formation equipment with which the mode in both 2nd ink supply mode that intercepts the ink supply from said 1st ink stores dept., and supplies ink to said print head from said 2nd ink stores dept. is chosen. When located in the 1st predetermined location with the holddown member which fixes said print head to said carriage, said 1st ink supply mode is chosen. Ink jet method image formation equipment characterized by having the mode selection member as which said 2nd ink supply mode is chosen when located in the 2nd different location from said 1st location, and which was attached in said holddown member.

[Claim 2] For said 1st and 2nd locations, said mode selection member is a print head according to claim 1 characterized by being what cancels immobilization of said print head fixed to said carriage by said holddown member when located in the 3rd different location.

[Claim 3] Said tube is what passes through the space inserted into said holddown member and said mode selection member. Said mode selection member It is the thing to which the inside of this tube is made for ink to flow without crushing said tube when this mode selection member is located in said 1st location. Ink jet method image formation equipment according to claim 1 or 2 characterized by being the thing to which crush said tube and the inside of this tube is made for ink not to flow when this mode selection member is located in said 2nd location.

[Claim 4] They are claims 1 and 2 characterized by to have the passage formation member which separates from said 2nd ink stores dept. when it connects with said 2nd ink stores dept., and it begins to pour ink to this 2nd ink stores dept. when said mode selection member is located in said 1st location, and said mode selection member is located in said 2nd location, and which was connected to the edge of said tube, or ink-jet method image-formation equipment given in 3.

[Claim 5] Said passage formation member is ink jet method image formation equipment according to claim 4 characterized by having the sealing member which seals said opening when opening into which ink flows is formed and said mode selection member is located in said 2nd location.

[Claim 6] Ink jet method image formation equipment according to claim 4 or 5 characterized by

having the controller which controls this passage formation member so that said opening of said passage formation member is opened and closed according to said 1st and 2nd ink supply mode.

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the ink jet method image formation equipment which breathes out ink to a record medium and forms an image.

[0002]

[Description of the Prior Art] The image formation equipment of the ink jet method which breathes out ink to a record medium and forms an image as one of the output units of a computer or a workstation is known.

[0003] An example of this ink jet method image formation equipment is explained with reference to drawing 19 and drawing 20.

[0004] Drawing 19 is the perspective view showing the ink jet printer which is an example of conventional ink jet method image formation equipment. Drawing 20 is the mimetic diagram showing the internal structure of the ink jet printer of drawing 19.

[0005] As shown in drawing 19, the control unit 12 for operating this ink jet printer 10 is formed in the ink jet printer 10. By the various switches arranged at the control unit 12, a paper type, online/off-line, a command, etc. are directed. Moreover, the opening 14 discharged while a record medium is inserted is formed in the ink jet printer 10. By inserting the tip of a record medium from this opening 14, this record medium is conveyed inside an ink jet printer 10, and an image is formed in a record medium in that interior. The part in which the image was formed among record media is discharged in the direction of arrow-head A from opening 14, and is held in a basket (not shown) etc. In addition, the bottle case 18 where the ink bottle 16 (refer to drawing 21) with which ink was stored is held is being fixed to side-attachment-wall 10a of an ink jet printer 10.

[0006] The ink jet printer 10 is equipped with the driving roller 24 and pinch roller 26 which convey a record medium intermittently in the print head 20 in which two or more ink delivery 20a ink carries out [ a ] the regurgitation was formed, the carriage 22 which carries this print head 20 and reciprocates to a main scanning direction (direction perpendicular to the space of drawing 20), and the direction (it is the recording paper conveyance direction and is called the direction of vertical scanning) of arrow-head A which intersects perpendicularly with this main scanning direction, as shown in drawing 20. Through the pinch roller arm 32 or coiled spring 34, the pinch roller 26 is being fixed to the guide stay 36 so that it can attach and detach free from a driving roller 24.

[0007] Moreover, the platen 28 in which a record medium is laid is arranged at the ink jet printer 10. The front part of a print head 20 is an image formation field in which an image is formed among this platen 28. The suction fan 30 sticks the part (henceforth an image formation part) located in this image formation field among record media to a platen 28 by attracting air from air suction hole 28a.

[0008] Stopping the record medium under conveyance temporarily by the driving roller 24 and

the pinch roller 26, and making carriage 22 reciprocate to the above-mentioned main scanning direction, in case an image is formed in a record medium, ink is breathed out from a print head 20 into the image formation part of a record medium, and the image for one band is formed (it prints). Then, the actuation which forms the following image for a band in the image formation part to which only predetermined die length conveys a record medium, and is newly located in an image formation field is repeated.

[0009] In addition, it is one side of the movable range of carriage 22, and the recovery device (not shown) which attracts ink compulsorily from ink delivery 20a, and makes the ink discharge condition from ink delivery 20a a discharge condition equivalent to the first stage is arranged in the location distant from the image formation field. If it will be in a required condition to make an early discharge condition recover image formation working and an ink discharge condition, carriage 22 will be moved above a recovery device and ink will be compulsorily attracted from ink delivery 20a.

[0010] The print head 20 is equipped with the ink cartridge 40 in which ink was stored. The ink stored in this ink cartridge 40 is supplied to a print head 20, and is breathed out from ink delivery 20a. The ink cartridge 40 is divided into two rooms of raw ink room 40a which stores ink with the liquid, and ink absorber room 40b stored in the condition of having made the sponge which absorbs ink absorbing ink.

[0011] Ink is supplied to an ink cartridge 40 through the ink supply tube 38 from the ink bottle 16 (refer to drawing 21 ) fixed to a location which is different in carriage 22. The needle unit 44 to which the needle 42 with which ink flows out was fixed is attached at the tip of the ink supply tube 38. Thus, the method which supplies ink to a print head 20 through the ink supply tube 38 or an ink cartridge 40 from the ink bottle 16 is called tubing method. About this tubing method, from drawing 21 to drawing 23 is referred to and explained.

[0012] Drawing 21 is the mimetic diagram showing a tubing method. Drawing 22 is the mimetic diagram showing the ink cartridge in which the needle unit was attached. Drawing 23 is the mimetic diagram showing the ink cartridge from which the needle unit was removed.

[0013] The ink which is breathed out from ink delivery 20a and used for image formation is stored in the ink bottle 16 for every Isshiki. This ink bottle 16 is carried in the bottle case 18 (refer to drawing 19 ), as mentioned above. In the bottle case 18, it has the ink buffer 46 which once stores the ink stored in the ink bottle 16. The needle 48 for incorporating ink is inserted into the liquid ink side of this ink buffer 46. This needle 48 is combined with the edge of the ink supply tube 38 made of resin.

[0014] The ink supply tube 38 is piped to carriage 22 along with the tube guide (not shown) prepared in parallel with the guide stay 36 (refer to drawing 20 ). In addition, in case carriage 22 reciprocates, this ink supply tube 38 changes free according to the location of carriage 22, and it is constituted so that reciprocation of carriage 22 may not be affected.

[0015] The needle unit 44 to which the needle 42 was fixed as mentioned above is combined with the point of the ink supply tube 38 piped by carriage 22. Sealing association of this needle unit 44 is carried out at the ink cartridge 40. Thereby, the ink 50 stored in the ink bottle 16 is supplied to an ink cartridge 40 via the ink supply tube 38, after only the specified quantity is stored in the ink buffer 46.

[0016] From ink delivery 20a, the ink of the specified quantity is breathed out at once. If ink is breathed out from ink delivery 20a, it originates in this ink regurgitation and the atmospheric pressure in an ink cartridge 40 will be in a negative pressure condition. According to this negative pressure condition, the ink of the ink buffer 46 passes along the ink supply tube 38, and

it flows out of the hole of the needle 42 located in an ink cartridge 40.

[0017] If ink is repeatedly breathed out from ink delivery 20a, the ink stored in ink and the ink bottle 16 of the ink buffer 46 will be consumed gradually. The ink residue detector (not shown) which detects the ink residue in the ink bottle 16 is installed in the ink jet printer 10 (refer to drawing 20 ). This ink residue detector's detection of that there is no ink residue in the ink bottle 16 displays an ink-less message on a control unit 12 (refer to drawing 19 ) based on the ink-less signal emitted from a control section (not shown).

[0018] In this case, the ink supply tube 38 is crushed using the cock 52 attached in carriage 22, and it is made for the ink in this ink supply tube 38 not to flow backwards to the direction of the ink bottle 16, as shown in drawing 23 . Thus, in the condition [ having crushed the ink supply tube 38 by the cock 52 ], the needle unit 44 combined with the ink cartridge 40 is removed from an ink cartridge 40. The removed needle unit 44 is inserted in joint holder 22a formed in carriage 22, and is kept.

[0019] Since an ink cartridge 40 is outside open for free passage and becomes an atmospheric pressure by removing the needle unit 44 from an ink cartridge 40, image formation actuation is continuable using the ink which remains in the ink cartridge 40. Thus, after finishing using the ink stored in the ink bottle 16, generally the mode which exhausts the ink stored in the ink cartridge 40 is known as "ink using-up mode" in the ink jet method image formation equipment of a tubing method. In addition, when the ink in an ink cartridge 40 is lost, the print head 20 and ink bottle 16 both sides by which it was equipped with the ink cartridge 40 will be exchanged for a new article.

[0020]

[Problem(s) to be Solved by the Invention] Change actuation to the above-mentioned "ink using-up mode" is suitably performed by the operator. There are two actuation items of this change actuation. An eye closes the cock 52 for ink antisuckbacks most. The needle unit 44 is removed from an ink cartridge 40 to the second, and it inserts in them at joint holder 22a. Among these, since the needle unit 44 is connected to the ink cartridge 40 by the bonding strength which is about several kg (joint), the second actuation cannot remove the needle unit 44 from an ink cartridge 40 very easily.

[0021] Moreover, in case it draws out in order to remove the needle unit 44 from an ink cartridge 40, an operator holds the needle unit 44 directly. For this reason, a needle 42 may deform, or the joint-seal (seal is carried out) material which seals between the needle unit 44 and ink cartridges 40 may get damaged, and it may damage, or ink may adhere to a hand or clothes. Therefore, it is necessary to work, taking care that such a trouble does not arise.

[0022] Furthermore, with the image recording equipment which performs color printing using the ink of two or more colors, only the number of print heads needs to perform the above-mentioned actuation. For this reason, the time and effort and time amount to operate will increase, and it becomes a very troublesome activity.

[0023] This invention aims at offering the ink jet method image formation equipment which can ensure [ easily and ] a change in the "ink using-up mode" mentioned above in view of the above-mentioned situation.

[0024]

[Means for Solving the Problem] The ink jet method image formation equipment of this invention for attaining the above-mentioned purpose The carriage which reciprocates to a predetermined main scanning direction, and the 1st ink stores dept. which is arranged in a different location from this carriage, and stores ink, The 2nd ink stores dept. which stores the ink

with which the print head carried in said carriage is equipped, and which is supplied to this print head, It has the tube along which the ink supplied to said 2nd ink stores dept. from said 1st ink stores dept. passes. The 1st ink supply mode which supplies ink to said print head via said 2nd ink stores dept. from said 1st ink stores dept., And it sets to the ink jet method image formation equipment with which the mode in both 2nd ink supply mode that intercepts the ink supply from said 1st ink stores dept., and supplies ink to said print head from said 2nd ink stores dept. is chosen. (1) When located in the holddown member which fixes said print head to said carriage, and the 1st (2) predetermined location, said 1st ink supply mode is chosen. When located in the 2nd different location from said 1st location, it is characterized by having the mode selection member as which said 2nd ink supply mode is chosen and which was attached in said holddown member.

[0025] here -- said mode selection member -- (3) -- when located in the 3rd different location from said 1st and 2nd locations, immobilization of said print head fixed to said carriage by said holddown member may be canceled.

[0026] (4) -- what passes through the space where said tube was inserted into said holddown member and said mode selection member -- it is -- (5) -- said mode selection member [ moreover, ] It is the thing to which the inside of this tube is made for ink to flow without crushing said tube when this mode selection member is located in said 1st location. (6) When this mode selection member is located in said 2nd location, you crush said tube and the inside of this tube is made for ink not to flow.

[0027] furthermore, above ink jet method image formation equipment -- (7) -- when said mode selection member is located in said 1st location, it connects with said 2nd ink stores dept., and sink appearance of the ink is carried out to this 2nd ink stores dept., and when said mode selection member is located in said 2nd location, you may have the passage formation member which separates from said 2nd ink stores dept. and which was connected to the edge of said tube.

[0028] further -- again -- (8) -- as for said passage formation member, opening into which ink flows is formed, and the (9) above-mentioned ink jet method image formation equipment may be equipped with the sealing member which seals said opening when said mode selection member is located in said 2nd location.

[0029] further -- again -- the above-mentioned ink jet method image formation equipment -- (10) -- you may have the controller which controls this passage formation member so that said opening of said passage formation member is opened and closed according to said 1st and 2nd ink supply mode.

[0030]

[Embodiment of the Invention] With reference to a drawing, the operation gestalt of the ink jet method image formation equipment of this invention is explained. From drawing 1 to drawing 11 is referred to, and the 1st operation gestalt is explained.

[0031] Drawing 1 is the perspective view showing the appearance of the ink jet method image formation equipment of the 1st operation gestalt. Drawing 2 is the mimetic diagram showing the internal configuration of the ink jet method image formation equipment of drawing 1. Drawing 3 is the perspective view showing the appearance of the print head of drawing 2. Drawing 4 is the mimetic diagram showing the fixed condition that the print head of drawing 3 was fixed to carriage. Drawing 5 is the mimetic diagram showing the ink supply condition which supplies ink to a print head from an ink bottle. Drawing 6 is the perspective view showing the 1st ink supply mode. Drawing 7 is the mimetic diagram showing the tube in the condition (the 1st ink supply mode) that ink can be supplied from an ink bottle. Drawing 8 is the perspective view showing the

2nd ink supply mode. Drawing 9 is the mimetic diagram showing the 2nd ink supply mode. Drawing 10 is the mimetic diagram showing the tube in the condition (the 2nd ink supply mode) that supply of the ink from an ink bottle was intercepted. Drawing 11 is the mimetic diagram showing the condition that a mode selection member is located in the 3rd location, and can remove a print head. In these drawings, the same sign is given to the same component as the component shown in drawing 23 from drawing 19.

[0032] As shown in drawing 1, the ink bottle case 62 where the ink bottle (it is an example of the 1st ink stores dept. said to this invention, and is the same as that of the ink bottle 16 shown in drawing 21.) was contained by ink jet method image formation equipment 60 is being fixed to side-attachment-wall 60a. From the ink bottle contained by the ink bottle case 62, as shown in drawing 2, ink is supplied to a print head 20 through the ink supply tube 64, an ink cartridge 70, etc. Such ink supply mode is called 1st ink supply mode by this invention. On the other hand, supply of the ink from an ink bottle is intercepted and the ink supply mode which supplies only the ink stored in the ink cartridge 70 to a print head 20 is called 2nd ink supply mode ("using-up mode") by this invention.

[0033] The description of ink jet method image formation equipment 60 is in the point equipped with the change-over in the 2nd ink supply mode from the 1st ink supply mode, or the mode change-over member 80 which can perform this reverse change-over in one-touch. This mode change-over member 80 is the configuration which lengthened S characters, as shown in drawing 2, drawing 6, etc. Moreover, ink is stored, and the above-mentioned ink cartridge 70 is carried in a print head 20, and has structure with which the mode change-over member 80 is stopped.

[0034] As shown in drawing 2 or drawing 5, a print head 20 is carried in carriage 22. The hook 66 (it is an example of the holddown member said to this invention) for fixing a print head 20 to this carriage 22 is formed in carriage 22, and the print head 20 carried in carriage 22 is fixed to carriage 22 by hook 66.

[0035] Upper limit section 80a of the above-mentioned mode change-over member 80 is being fixed to the hook 66 by rotation shaft 66a free [ rotation ]. Two connection holes 82 and 84 are located in a line, and are formed in lower limit section 80b of the mode change-over member 80. Lock pawl 20b which fits into these two connection holes 82 and 84 alternatively, and is caught in them is formed in the print head 20. If lock pawl 20b is caught in the connection hole 82, it will become the 1st ink supply mode, and ink is supplied to a print head 20 through the ink supply tube 64, an ink cartridge 70, etc. from the ink bottle contained by the ink bottle case 62. On the other hand, if lock pawl 20b is caught in the connection hole 84, it will become the 2nd ink supply mode, and the ink supply tube 64 is crushed, the ink supply from an ink bottle is intercepted, and ink is supplied to a print head 20 only from an ink cartridge 70.

[0036] A location of the mode change-over member 80 where lock pawl 20b is caught in the connection hole 82 is an example of the 1st location said to this invention. A location of the mode change-over member 80 where lock pawl 20b is caught in the connection hole 84 is an example of the 2nd location said to this invention. Moreover, if the mode change-over member 80 is rotated up (the direction of arrow-head B) as shown in drawing 11, immobilization of hook 66 separates and a print head 20 can be removed from carriage 22. A location when the mode change-over member 80 rotates up is an example of the 3rd location said to this invention.

[0037] The mode change-over member 80 and print head 20 which were mentioned above are further explained to a detail.

[0038] As shown in drawing 4, drawing 5, etc., opening is formed in the lower part of a bridge wall although the ink cartridge 70 is divided into raw ink room 70a which stores ink in the state



of the liquid, and sponge 70b stored in the condition of having made sponge absorbing ink. The ink stored in raw ink room 70a is drawn in sponge room 70b through opening by the negative pressure which originates in the regurgitation pulse of a print head 20, and is produced.

[0039] Free passage hole 70c which makes atmospheric air open this sponge room 70b for free passage is formed above sponge room 70b. Free passage hole 70c is formed with the configuration and a dimension from which the interior of an ink cartridge 70 will be in the optimal negative pressure condition.

[0040] The hole is formed above raw ink room 70a, and this hole is closed by joint shielding 70d in which the joint needle 86 (it is an example of the passage formation member said to this invention) mentioned later is inserted. Joint shielding 70d is rubber material with a thickness of about 1mm. Although it is broken through with the joint needle 86 joint shielding 70d and a hole opens, this hole is closed by elastic contraction of rubber where the joint needle 86 is inserted.

[0041] As shown in drawing 4, carriage 22 has electrode plate 22a for sending an ink regurgitation signal to a print head 20. Energization becomes possible when this electrode plate 22a contacts the contact section of a print head 20.

[0042] As mentioned above, the hook 66 is being fixed to carriage 22 free [ rotation ]. Turning effort is given in the direction which fixes a print head 20 to this hook 66 with a spring 68.

Therefore, a print head 20 will be pressurized by hook 66, and will be fixed.

[0043] It turned caudad from the center section of the mode change-over member 80, and the joint needle 86 has projected. This joint needle 86 is being fixed to the mode change-over member 80 so that it may become the posture which can be inserted in joint shielding 70d. The upper limit section of the joint needle 86 is connected to the ink supply tube 64 piped from the ink bottle 16 (refer to drawing 21). The ink stored in the ink bottle 16 is supplied to an ink cartridge 70 through the ink supply tube 64 and the joint needle 86. In addition, hollow molding of the joint needle 86 is carried out at the bore of 1mm or less. At least one opening is formed in the point of the joint needle 86, and ink flows out of this opening.

[0044] The sealant 88 which closes and seals free passage hole 70c of an ink cartridge 70 is being fixed to the inferior surface of tongue of upper limit section 80a of the mode change-over member 80. Where lock pawl 20b of a print head 20 is hooked on the connection hole 82 of the mode change-over member 80, as shown in drawing 5, a sealant 88 seals free passage hole 70c.

[0045] The compression coil spring 90 is being fixed near the fixed position of a sealant 88. When lock pawl 20b is caught in the connection holes 82 and 84 and an ink cartridge 70 is fixed to a print head 20, this compression coil spring 90 is constituted so that an ink cartridge 70 may be forced on a print head 20. By this, in both above-mentioned 1st and 2nd ink supply mode, positioning with the mode change-over member 80 and a print head 20 will be made.

[0046] The above-mentioned 1st ink supply mode is explained.

[0047] As mentioned above, in the 1st ink supply mode, ink is supplied to a print head 20 through the ink supply tube 64, an ink cartridge 70, etc. from the ink bottle contained by the ink bottle case 62. In this 1st ink supply mode, as shown in drawing 5, lock pawl 20b is hooked on the connection hole 82. In this case, as shown in drawing 7, the ink supply tube 64 is not crushed in the space inserted into the hook 66 and the mode selection member 80. Moreover, the joint needle 86 has broken through joint shielding 70d, and opening of the joint needle 86 is located in raw ink room 70a. Furthermore, free passage hole 70c is closed by the sealant 88. In the above condition, the ink cartridge 70 is in the airtight condition. Therefore, if ink is breathed out from ink delivery 20a of a print head 20 and sponge room 70b becomes negative pressure, ink will be supplied from an ink bottle via the joint needle 86 or the ink supply tube 64.

[0048] The above-mentioned 2nd ink supply mode is explained.

[0049] As mentioned above, in the 2nd ink supply mode, supply of the ink from an ink bottle is intercepted and only the ink stored in the ink cartridge 70 is supplied to a print head 20. This 2nd ink supply mode is also called "using-up mode." In switching to the 2nd ink supply mode from the 1st ink supply mode, the lever 89 located at the tip of the mode change-over member 80 is pulled up, lock pawl 20b is removed from the connection hole 82, and lock pawl 20b is hooked on the connection hole 84.

[0050] In the 2nd ink supply mode, since a compression coil spring 90 pushes up the mode change-over member 80, the mode change-over member 80 rotates up (in the direction of arrow-head B), and is located in a high location compared with the time of the 1st ink supply mode. This high location is an example of the 2nd location said to this invention. Moreover, in the 2nd ink supply mode, the joint needle 86 escapes from and comes out of joint shielding 70d, and separates from raw ink room 70a of an ink cartridge 70. Furthermore, in the 2nd ink supply mode, it separates from free passage hole 70c, and thereby, the airtight condition of sponge room 70b is canceled, and sponge room 70b also opens for free passage outside the sealant 88 which had sealed free passage hole 70c.

[0051] Since the mode change-over member 80 rotates up as mentioned above, as shown in drawing 10, the ink supply tube 64 is crushed in the space inserted into the hook 66 and the mode selection member 80 (put). It puts, and an amount is this extent that crushes a part for the bore of the ink supply tube 64, and especially the thick section of the ink supply tube 64 is set as an amount which is not crushed.

[0052] In the 2nd ink supply mode, while separating the joint needle 86 from raw ink room 70a, free passage hole 70c is made to open wide, and further, it crushes so that ink may not pass along the ink supply tube 64. For this reason, it can prevent that the ink in the ink supply tube 64 which even the joint needle 86 is full of flows backwards to an ink bottle side with the change in the mode. Therefore, actuation of two processes will be once performed to coincidence by actuation.

[0053] Actuation of removing a print head 20 from carriage 22 is explained.

[0054] The mode change-over member 80 is rotated rather than the location at the time of the 2nd ink supply mode to an upper (the direction of arrow-head B) location (it is an example of the 3rd location said to this invention). Tube-guide 64a pushes hook 66, the ink supply tube 64 putting and maintaining a condition by this rotation. Thereby, as shown in drawing 11, hook 66 also rotates in the direction of arrow-head B. Under the hook 66, lever 66b in contact with the side face of a print head 20 is formed, and this lever 66b extrudes a print head 20. Consequently, while the lock of the hook 66 which is fixing the print head 20 is canceled and being able to remove a print head 20 from carriage 22, an ink cartridge 70 can also be removed.

[0055] From drawing 12 to drawing 18 is referred to, and the 2nd operation gestalt of the ink jet method image formation equipment of this invention is explained.

[0056] Drawing 12 is the mimetic diagram showing the ink supply mode which supplies ink to a print head from an ink bottle in the ink jet method image formation equipment of the 2nd operation gestalt. Drawing 13 is the perspective view showing appearances, such as a print head at the time of the mode of drawing 12. Drawing 14 is the perspective view showing the joint base connected with the print head. Drawing 15 is the sectional view showing the configuration of a joint base. Drawing 16 is the perspective view showing the configuration of a joint base. Drawing 17 is the mimetic diagram showing the mode which intercepted the ink supply from an ink bottle. Drawing 18 is the mimetic diagram showing the mode which can take out a print head from carriage. In these drawings, the same sign is given to the same component as the

component shown in drawing 11 from drawing 1 .

[0057] As shown in drawing 12 , the ink bottle case 62 (refer to drawing 1 ) where the ink bottle (it is an example of the 1st ink stores dept. said to this invention, and is the same as that of the ink bottle 16 shown in drawing 21 .) was contained by ink jet method image formation equipment 100 is being fixed to the side attachment wall (not shown). Ink is supplied to a print head 20 through the ink supply tube 102, an ink cartridge 110, etc. from the ink bottle contained by the ink bottle case 62. Such ink supply mode is called 1st ink supply mode by this invention. On the other hand, supply of the ink from an ink bottle is intercepted and the ink supply mode which supplies only the ink stored in the ink cartridge 110 to a print head 20 is called 2nd ink supply mode ("using-up mode") by this invention.

[0058] The description of ink jet method image formation equipment 100 is in the point equipped with the change-over in the 2nd ink supply mode from the 1st ink supply mode, or the mode change-over member 120 which can perform this reverse change-over in one-touch. The joint base 140 mentioned later is built into this mode change-over member 120. Moreover, ink is stored, and the above-mentioned ink cartridge 110 is carried in a print head 20, and has structure with which the mode change-over member 120 is stopped.

[0059] As shown in drawing 12 or drawing 17 , a print head 20 is carried in carriage 22. The hook 66 (it is an example of the holddown member said to this invention) for fixing a print head 20 to this carriage 22 is formed in carriage 22, and the print head 20 carried in carriage 22 is fixed to carriage 22 by hook 66.

[0060] End section 120a of the above-mentioned mode change-over member 120 is being fixed to the hook 66 by rotation shaft 66a free [ rotation ]. The connection hole 122 is formed in other end 120b of the mode change-over member 120. Lock pawl 20b which fits into this connection hole 122 and is caught in it is formed in the print head 20. If lock pawl 20b is caught in the connection hole 122, it will become the 1st ink supply mode, and ink is supplied to a print head 20 through the ink supply tube 102, an ink cartridge 110, etc. from the ink bottle contained by the ink bottle case 62. On the other hand, if lock pawl 20b separates from the connection hole 122, it will become the 2nd ink supply mode, and the ink supply from the ink bottle contained by the ink bottle case 62 is intercepted, and ink is supplied to a print head 20 only from an ink cartridge 110.

[0061] A location of the mode change-over member 120 where lock pawl 20b is caught in the connection hole 122 is an example of the 1st location said to this invention. The location of the mode change-over member 120 from which lock pawl 20b separates from the connection hole 122 is an example of the 2nd location said to this invention. Moreover, if the mode change-over member 120 is rotated up (the direction of arrow-head B) as shown in drawing 18 , immobilization of hook 66 separates and a print head 20 can be removed from carriage 22. A location when the mode change-over member 120 rotates up is an example of the 3rd location said to this invention.

[0062] The mode change-over member 120 and print head 20 which were mentioned above are further explained to a detail.

[0063] As shown in drawing 12 , drawing 14 , etc., opening is formed in the lower part of a bridge wall although the ink cartridge 110 is divided into raw ink room 110a which stores ink in the state of the liquid, and sponge 110b stored in the condition of having made sponge absorbing ink. The ink stored in raw ink room 110a is drawn in sponge room 110b through opening by the negative pressure which originates in the regurgitation pulse of a print head 20, and is produced.

[0064] Free passage hole 110c which makes atmospheric air open this sponge room 110b for free

passage is formed above sponge room 110b. Free passage hole 110c is formed with the configuration and a dimension from which the interior of an ink cartridge 110 will be in the optimal negative pressure condition.

[0065] The connection section 112 connected with the joint base 140 is formed in the upper part of raw ink room 110a. Ink passage 112a which is open for free passage to raw ink room 110a is formed in this connection section 112. It is closed by joint shielding 112b by which the joint needle 142 (it is an example of the passage formation member said to this invention) mentioned later is inserted in opening of ink passage 112a. Joint shielding 112b is rubber material with a thickness of about 1mm. Although joint shielding 112b is broken through with the joint needle 142 and a hole opens it, this hole is closed by elastic contraction of rubber where the joint needle 142 is inserted.

[0066] As mentioned above, the hook 66 is being fixed to carriage 22 free [ rotation ]. Turning effort is given in the direction which fixes a print head 20 to this hook 66 with a spring 68. Therefore, a print head 20 will be pressurized by hook 66, and will be fixed.

[0067] As shown in drawing 16 , along with the longitudinal direction (the height direction of the joint base 140), the joint needle 142 (it is an example of the passage formation member said to this invention) is being fixed to the interior of the joint cylinder-like base 140. Hole 142a of a large number into which ink flows is formed in the point of the joint needle 142. The back end section of the joint needle 142 is connected to the ink supply tube 102.

[0068] Moreover, the fixed wall 144 is formed in 2/3 of the locations of the die-length direction of the joint base 140. The point side of the joint needle 142 is a cylinder-like cavity from this fixed wall 144. The compression coil spring 146 is inserted in this cavity, and that back end section is in contact with the fixed wall 144. Moreover, the slider 148 of the shape of a cylinder exactly inserted in the interior of the cavity of the joint base 140 is in contact with the point of a compression coil spring 146. The sponge material 150 is stuffed into the interior of this slider 148. For this reason, the peripheral face of the sponge material 150 is covered with a slider 148. The slider 148 is manufactured with the ingredient with low coefficient of friction to the joint base 140. The die length (height) of a slider 148 is the quadrant grade of the die length of the cavity of the joint base 140.

[0069] Along with the longitudinal direction, the hole a little smaller than the outer diameter of the joint needle 142 is formed in the center section of the sponge material 148. The joint needle 142 is inserted in this hole.

[0070] The above-mentioned slider 148 is energized by the spring force (energization force) of a compression coil spring 146 towards opening 140a of the joint base 140. Stopper 140b is formed in this opening 140a so that a slider 148 may not fall out. When the slider 148 is located near the opening 140a, the sponge material 150 has covered the point of the joint needle 142, and, for this reason, hole 142a of the joint needle 142 is closed by the sponge material 150.

[0071] On the other hand, when the force in which a compression coil spring 146 is contracted acts on a slider 148, a slider 148 moves in the inner part of the joint base 140 with the sponge material 150. Thereby, hole 142a of the joint needle 142 is exposed. In addition, hollow molding of the joint needle 142 is carried out at the bore of 1mm or less. Moreover, ink flows out of hole 142a formed in the point of the joint needle 142.

[0072] The sealant 124 which closes and seals free passage hole 110c of an ink cartridge 110 is being fixed to the inferior surface of tongue near the upper limit section 120a of the mode change-over member 120. Where lock pawl 20b of a print head 20 is hooked on the connection hole 122 of the mode change-over member 120, as shown in drawing 12 , a sealant 124 seals free

passage hole 110c.

[0073] The above-mentioned 1st ink supply mode is explained.

[0074] As mentioned above, in the 1st ink supply mode, ink is supplied to a print head 20 through the ink supply tube 102, an ink cartridge 110, etc. from the ink bottle contained by the ink bottle case 62. In this 1st ink supply mode, as shown in drawing 17, lock pawl 20b is hooked on the connection hole 122. In this case, the joint base 140 runs against the connection section 112, the force in which a compression coil spring 146 is contracted acts on a slider 148, and a slider 148 moves in the inner part of the joint base 140 with the sponge material 150. Thereby, hole 142a of the joint needle 142 is exposed within ink passage 112a of the connection section 112, and an ink bottle and raw ink room 110a are connected.

[0075] In addition, in this condition, the locking lever 152 (refer to drawing 14) formed in the point of the joint base 140 is run and fixed to the stopper 126 formed in the mode change-over member 120. Moreover, free passage hole 110c will be sealed by the sealant 124, the interior of an ink cartridge 110 will be maintained at the optimal negative pressure condition, and ink will be supplied.

[0076] The above-mentioned 2nd ink supply mode is explained.

[0077] As mentioned above, in the 2nd ink supply mode, supply of the ink from an ink bottle is intercepted and only the ink stored in the ink cartridge 110 is supplied to a print head 20. This 2nd ink supply mode is also called "using-up mode." In switching to the 2nd ink supply mode from the 1st ink supply mode, the lever 128 located at the tip of the mode change-over member 120 is pulled up, and lock pawl 20b is removed from the connection hole 122. Thereby, the locking lever 152 of the joint base 140 is depressed, and it moves in the direction in which the joint base 140 separates from the connection section 112 according to the energization force of a compression coil spring 146.

[0078] The sealing condition of free passage hole 110c is canceled, and sponge room 110b is open for free passage to atmospheric air with this migration. Moreover, the joint needle 142 escapes from and comes out of sealant 112b, and hole 142a of the joint needle 142 is closed by the sponge material 150. Therefore, the ink supply from an ink bottle is intercepted such in a condition. Moreover, since hole 142a of the joint needle 142 is closed by the sponge material 150, the ink from the ink bottle in the ink supply tube 102 interior to the joint needle 142 does not flow backwards in an ink bottle.

[0079] Actuation of removing a print head 20 from carriage 22 is explained.

[0080] The lever 128 of the mode change-over member 120 is pulled up highly, and a medial axis is made to rotate the mode change-over member 120 by carrying out rotation shaft 66a. By this rotation, as shown in drawing 18, hook 66 also rotates in the direction of arrow-head B focusing on rotation shaft 66a. Under the hook 66, lever 66c in contact with the side face of a print head 20 is formed, and this lever 66c extrudes a print head 20. Consequently, while the lock of the hook 66 which is fixing the print head 20 is canceled and being able to remove a print head 20 from carriage 22, an ink cartridge 110 can also be removed.

[0081] With the 1st and 2nd operation gestalt mentioned above, in case it switches to the 1st ink supply mode or the 2nd ink supply mode, a user moves the mode change-over member 80,120 by hand. When the automatic switchover device and controller (control device) which can move this mode change-over member 80,120 automatically are built into ink jet method image formation equipment, based on the residue ink detection signal which supports the residue of the ink stored in the ink bottle 16, ink jet method image formation equipment moves a connection member automatically, and is switched to the 2nd ink supply mode (using-up mode) from the 1st ink

supply mode. For this reason, an operator does not need to perform change actuation, without interrupting printing actuation also in image printing. Therefore, without caring about the ink piece of the ink bottle 16, since printing actuation is continuable, operability improves, and user-friendly ink jet method image formation equipment is obtained.

[0082]

[Effect of the Invention] Since it is switched to the 2nd ink supply mode from the 1st ink supply mode with the ink jet method image formation equipment of this invention by moving a mode selection member to the 2nd location from the 1st location as explained above, this change can be ensured [ easily and ]. Moreover, since the mode selection member is attached in the holddown member, compared with the case where these are arranged separately, it becomes a simple configuration.

[0083] Here, since immobilization of a print head is canceled by locating a mode selection member in the 3rd location when are located in the 3rd different location and said 1st and 2nd locations are what cancels immobilization of said print head fixed to said carriage by said holddown member, said mode selection member can exchange print heads easily.

[0084] Said tube is what passes through the space inserted into said holddown member and said mode selection member. Moreover, said mode selection member It is the thing to which the inside of this tube is made for ink to flow without crushing said tube when this mode selection member is located in said 1st location. When this mode selection member is located in said 2nd location and it is the thing to which crush said tube and the inside of this tube is made for ink not to flow Since ink does not flow the inside of a tube by locating a mode selection member in the 2nd location, ink can prevent flowing backwards to the 1st ink stores dept.

[0085] Furthermore, connect with said 2nd ink stores dept., and it is begun to pour ink to this 2nd ink stores dept., when said mode selection member is located in said 1st location. When said mode selection member is located in said 2nd location, separate from said 2nd ink stores dept. Since a passage formation member separates from the 2nd ink stores dept. when ink jet method image formation equipment is equipped with the passage formation member connected to the edge of said tube, and a mode selection member is located in the 2nd location, it is switched to the 2nd ink supply mode much more certainly.

[0086] Since, as for said passage formation member, a sealing member seals opening of a passage formation member when opening into which ink flows is formed, said mode selection member is located in said 2nd location and ink jet method image formation equipment is equipped with the sealing member which seals said opening, ink does not leak from this opening carelessly further again.

[0087] Since opening of a passage formation member is opened [ so that said opening of said passage formation member may be opened and closed according to said 1st and 2nd ink supply mode ] and closed by the controller further again when ink jet method image formation equipment is equipped with the controller which controls this passage formation member, the user of ink jet method image formation equipment does not need to perform change actuation. Therefore, without caring about the ink piece of the 1st ink stores dept., since printing actuation is continuable, operability improves, and user-friendly ink jet method image formation equipment is obtained.

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## TECHNICAL FIELD

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[Field of the Invention] This invention relates to the ink jet method image formation equipment which breathes out ink to a record medium and forms an image.

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## PRIOR ART

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[Description of the Prior Art] The image formation equipment of the ink jet method which breathes out ink to a record medium and forms an image as one of the output units of a computer or a workstation is known.

[0003] An example of this ink jet method image formation equipment is explained with reference to drawing 19 and drawing 20 .

[0004] Drawing 19 is the perspective view showing the ink jet printer which is an example of conventional ink jet method image formation equipment. Drawing 20 is the mimetic diagram showing the internal structure of the ink jet printer of drawing 19 .

[0005] As shown in drawing 19 , the control unit 12 for operating this ink jet printer 10 is formed in the ink jet printer 10. By the various switches arranged at the control unit 12, a paper type, online/off-line, a command, etc. are directed. Moreover, the opening 14 discharged while a record medium is inserted is formed in the ink jet printer 10. By inserting the tip of a record medium from this opening 14, this record medium is conveyed inside an ink jet printer 10, and an image is formed in a record medium in that interior. The part in which the image was formed among record media is discharged in the direction of arrow-head A from opening 14, and is held in a basket (not shown) etc. In addition, the bottle case 18 where the ink bottle 16 (refer to drawing 21 ) with which ink was stored is held is being fixed to side-attachment-wall 10a of an ink jet printer 10.

[0006] The ink jet printer 10 is equipped with the driving roller 24 and pinch roller 26 which convey a record medium intermittently in the print head 20 in which two or more ink delivery 20a ink carries out [ a ] the regurgitation was formed, the carriage 22 which carries this print head 20 and reciprocates to a main scanning direction (direction perpendicular to the space of drawing 20 ), and the direction (it is the recording paper conveyance direction and is called the direction of vertical scanning) of arrow-head A which intersects perpendicularly with this main scanning direction, as shown in drawing 20 . Through the pinch roller arm 32 or coiled spring 34, the pinch roller 26 is being fixed to the guide stay 36 so that it can attach and detach free from a driving roller 24.

[0007] Moreover, the platen 28 in which a record medium is laid is arranged at the ink jet printer 10. The front part of a print head 20 is an image formation field in which an image is formed among this platen 28. The suction fan 30 sticks the part (henceforth an image formation part) located in this image formation field among record media to a platen 28 by attracting air from air suction hole 28a.

[0008] Stopping the record medium under conveyance temporarily by the driving roller 24 and the pinch roller 26, and making carriage 22 reciprocate to the above-mentioned main scanning direction, in case an image is formed in a record medium, ink is breathed out from a print head 20 into the image formation part of a record medium, and the image for one band is formed (it prints). Then, the actuation which forms the following image for a band in the image formation part to which only predetermined die length conveys a record medium, and is newly located in an image formation field is repeated.

[0009] In addition, it is one side of the movable range of carriage 22, and the recovery device (not shown) which attracts ink compulsorily from ink delivery 20a, and makes the ink discharge

condition from ink delivery 20a a discharge condition equivalent to the first stage is arranged in the location distant from the image formation field. If it will be in a required condition to make an early discharge condition recover image formation working and an ink discharge condition, carriage 22 will be moved above a recovery device and ink will be compulsorily attracted from ink delivery 20a.

[0010] The print head 20 is equipped with the ink cartridge 40 in which ink was stored. The ink stored in this ink cartridge 40 is supplied to a print head 20, and is breathed out from ink delivery 20a. The ink cartridge 40 is divided into two rooms of raw ink room 40a which stores ink with the liquid, and ink absorber room 40b stored in the condition of having made the sponge which absorbs ink absorbing ink.

[0011] Ink is supplied to an ink cartridge 40 through the ink supply tube 38 from the ink bottle 16 (refer to drawing 21 ) fixed to a location which is different in carriage 22. The needle unit 44 to which the needle 42 with which ink flows out was fixed is attached at the tip of the ink supply tube 38. Thus, the method which supplies ink to a print head 20 through the ink supply tube 38 or an ink cartridge 40 from the ink bottle 16 is called tubing method. About this tubing method, from drawing 21 to drawing 23 is referred to and explained.

[0012] Drawing 21 is the mimetic diagram showing a tubing method. Drawing 22 is the mimetic diagram showing the ink cartridge in which the needle unit was attached. Drawing 23 is the mimetic diagram showing the ink cartridge from which the needle unit was removed.

[0013] The ink which is breathed out from ink delivery 20a and used for image formation is stored in the ink bottle 16 for every Isshiki. This ink bottle 16 is carried in the bottle case 18 (refer to drawing 19 ), as mentioned above. In the bottle case 18, it has the ink buffer 46 which once stores the ink stored in the ink bottle 16. The needle 48 for incorporating ink is inserted into the liquid ink side of this ink buffer 46. This needle 48 is combined with the edge of the ink supply tube 38 made of resin.

[0014] The ink supply tube 38 is piped to carriage 22 along with the tube guide (not shown) prepared in parallel with the guide stay 36 (refer to drawing 20 ). In addition, in case carriage 22 reciprocates, this ink supply tube 38 changes free according to the location of carriage 22, and it is constituted so that reciprocation of carriage 22 may not be affected.

[0015] The needle unit 44 to which the needle 42 was fixed as mentioned above is combined with the point of the ink supply tube 38 piped by carriage 22. Sealing association of this needle unit 44 is carried out at the ink cartridge 40. Thereby, the ink 50 stored in the ink bottle 16 is supplied to an ink cartridge 40 via the ink supply tube 38, after only the specified quantity is stored in the ink buffer 46.

[0016] From ink delivery 20a, the ink of the specified quantity is breathed out at once. If ink is breathed out from ink delivery 20a, it originates in this ink regurgitation and the atmospheric pressure in an ink cartridge 40 will be in a negative pressure condition. According to this negative pressure condition, the ink of the ink buffer 46 passes along the ink supply tube 38, and it flows out of the hole of the needle 42 located in an ink cartridge 40.

[0017] If ink is repeatedly breathed out from ink delivery 20a, the ink stored in ink and the ink bottle 16 of the ink buffer 46 will be consumed gradually. The ink residue detector (not shown) which detects the ink residue in the ink bottle 16 is installed in the ink jet printer 10 (refer to drawing 20 ). This ink residue detector's detection of that there is no ink residue in the ink bottle 16 displays an ink-less message on a control unit 12 (refer to drawing 19 ) based on the ink-less signal emitted from a control section (not shown).

[0018] In this case, the ink supply tube 38 is crushed using the cock 52 attached in carriage 22,



and it is made for the ink in this ink supply tube 38 not to flow backwards to the direction of the ink bottle 16, as shown in drawing 23 . Thus, in the condition [ having crushed the ink supply tube 38 by the cock 52 ], the needle unit 44 combined with the ink cartridge 40 is removed from an ink cartridge 40. The removed needle unit 44 is inserted in joint holder 22a formed in carriage 22, and is kept.

[0019] Since an ink cartridge 40 is outside open for free passage and becomes an atmospheric pressure by removing the needle unit 44 from an ink cartridge 40, image formation actuation is continuable using the ink which remains in the ink cartridge 40. Thus, after finishing using the ink stored in the ink bottle 16, generally the mode which exhausts the ink stored in the ink cartridge 40 is known as "ink using-up mode" in the ink jet method image formation equipment of a tubing method. In addition, when the ink in an ink cartridge 40 is lost, the print head 20 and ink bottle 16 both sides by which it was equipped with the ink cartridge 40 will be exchanged for a new article.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] Since it is switched to the 2nd ink supply mode from the 1st ink supply mode with the ink jet method image formation equipment of this invention by moving a mode selection member to the 2nd location from the 1st location as explained above, this change can be ensured [ easily and ]. Moreover, since the mode selection member is attached in the holddown member, compared with the case where these are arranged separately, it becomes a simple configuration.

[0083] Here, since immobilization of a print head is canceled by locating a mode selection member in the 3rd location when are located in the 3rd different location and said 1st and 2nd locations are what cancels immobilization of said print head fixed to said carriage by said holddown member, said mode selection member can exchange print heads easily.

[0084] Moreover, said tube passes through the space inserted into said holddown member and said mode selection member. Said mode selection member is a thing to which the inside of this tube is made for ink to flow without crushing said tube when this mode selection member is located in said 1st location. When this mode selection member is located in said 2nd location and it is the thing to which crush said tube and the inside of this tube is made for ink not to flow Since ink does not flow the inside of a tube by locating a mode selection member in the 2nd location, ink can prevent flowing backwards to the 1st ink stores dept.

[0085] Furthermore, it is a time of connecting with said 2nd ink stores dept., and beginning to pour ink to this 2nd ink stores dept., when said mode selection member is located in said 1st location, and said mode selection member being located in said 2nd location. Since a passage formation member separates from the 2nd ink stores dept. when ink jet method image formation equipment is equipped with the passage formation member which separates from the 2nd ink stores dept. of \*\*\*\*\* and which was connected to the edge of said tube, and a mode selection member is located in the 2nd location, it is switched to the 2nd ink supply mode much more certainly.

[0086] Since, as for said passage formation member, a sealing member seals opening of a passage formation member when opening into which ink flows is formed, said mode selection member is located in said 2nd location and ink jet method image formation equipment is equipped with the sealing member which seals said opening, ink does not leak from this opening carelessly further again.

[0087] Since opening of a passage formation member is opened [ so that said opening of said passage formation member may be opened and closed according to said 1st and 2nd ink supply mode ] and closed by the controller further again when ink jet method image formation equipment is equipped with the controller which controls this passage formation member, the user of ink jet method image formation equipment does not need to perform change actuation. Therefore, without caring about the ink piece of the 1st ink stores dept., since printing actuation is continuable, operability improves, and user-friendly ink jet method image formation equipment is obtained.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] Change actuation to the above-mentioned "ink using-up mode" is suitably performed by the operator. There are two actuation items of this change actuation. An eye closes the cock 52 for ink antisuckbacks most. The needle unit 44 is removed from an ink cartridge 40 to the second, and it inserts in them at joint holder 22a. Among these, since the needle unit 44 is connected to the ink cartridge 40 by the bonding strength which is about several kg (joint), the second actuation cannot remove the needle unit 44 from an ink cartridge 40 very easily.

[0021] Moreover, in case it draws out in order to remove the needle unit 44 from an ink cartridge 40, an operator holds the needle unit 44 directly. For this reason, a needle 42 may deform, or the joint-seal (seal is carried out) material which seals between the needle unit 44 and ink cartridges 40 may get damaged, and it may damage, or ink may adhere to a hand or clothes. Therefore, it is necessary to work, taking care that such a trouble does not arise.

[0022] Furthermore, with the image recording equipment which performs color printing using the ink of two or more colors, only the number of print heads needs to perform the above-mentioned actuation. For this reason, the time and effort and time amount to operate will increase, and it becomes a very troublesome activity.

[0023] This invention aims at offering the ink jet method image formation equipment which can ensure [ easily and ] a change in the "ink using-up mode" mentioned above in view of the above-mentioned situation.

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## MEANS

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[Means for Solving the Problem] The ink jet method image formation equipment of this invention for attaining the above-mentioned purpose The carriage which reciprocates to a predetermined main scanning direction, and the 1st ink stores dept. which is arranged in a different location from this carriage, and stores ink, The 2nd ink stores dept. which stores the ink with which the print head carried in said carriage is equipped, and which is supplied to this print head, It has the tube along which the ink supplied to said 2nd ink stores dept. from said 1st ink stores dept. passes. The 1st ink supply mode which supplies ink to said print head via said 2nd ink stores dept. from said 1st ink stores dept., And it sets to the ink jet method image formation equipment with which the mode in both 2nd ink supply mode that intercepts the ink supply from said 1st ink stores dept., and supplies ink to said print head from said 2nd ink stores dept. is chosen. (1) When located in the holddown member which fixes said print head to said carriage, and the 1st (2) predetermined location, said 1st ink supply mode is chosen. When located in the 2nd different location from said 1st location, it is characterized by having the mode selection

member as which said 2nd ink supply mode is chosen and which was attached in said holddown member.

[0025] here -- said mode selection member -- (3) -- when located in the 3rd different location from said 1st and 2nd locations, immobilization of said print head fixed to said carriage by said holddown member may be canceled.

[0026] (4) -- what passes through the space where said tube was inserted into said holddown member and said mode selection member -- it is -- (5) -- said mode selection member [ moreover, ] It is the thing to which the inside of this tube is made for ink to flow without crushing said tube when this mode selection member is located in said 1st location. (6) When this mode selection member is located in said 2nd location, you crush said tube and the inside of this tube is made for ink not to flow.

[0027] furthermore, above ink jet method image formation equipment -- (7) -- when said mode selection member is located in said 1st location, it connects with said 2nd ink stores dept., and sink appearance of the ink is carried out to this 2nd ink stores dept., and when said mode selection member is located in said 2nd location, you may have the passage formation member which separates from said 2nd ink stores dept. and which was connected to the edge of said tube.

[0028] further -- again -- (8) -- as for said passage formation member, opening into which ink flows is formed, and the (9) above-mentioned ink jet method image formation equipment may be equipped with the sealing member which seals said opening when said mode selection member is located in said 2nd location.

[0029] further -- again -- the above-mentioned ink jet method image formation equipment -- (10) -- you may have the controller which controls this passage formation member so that said opening of said passage formation member is opened and closed according to said 1st and 2nd ink supply mode.

[0030]

[Embodiment of the Invention] With reference to a drawing, the operation gestalt of the ink jet method image formation equipment of this invention is explained. From drawing 1 to drawing 11 is referred to, and the 1st operation gestalt is explained.

[0031] Drawing 1 is the perspective view showing the appearance of the ink jet method image formation equipment of the 1st operation gestalt. Drawing 2 is the mimetic diagram showing the internal configuration of the ink jet method image formation equipment of drawing 1. Drawing 3 is the perspective view showing the appearance of the print head of drawing 2. Drawing 4 is the mimetic diagram showing the fixed condition that the print head of drawing 3 was fixed to carriage. Drawing 5 is the mimetic diagram showing the ink supply condition which supplies ink to a print head from an ink bottle. Drawing 6 is the perspective view showing the 1st ink supply mode. Drawing 7 is the mimetic diagram showing the tube in the condition (the 1st ink supply mode) that ink can be supplied from an ink bottle. Drawing 8 is the perspective view showing the 2nd ink supply mode. Drawing 9 is the mimetic diagram showing the 2nd ink supply mode. Drawing 10 is the mimetic diagram showing the tube in the condition (the 2nd ink supply mode) that supply of the ink from an ink bottle was intercepted. Drawing 11 is the mimetic diagram showing the condition that a mode selection member is located in the 3rd location, and can remove a print head. In these drawings, the same sign is given to the same component as the component shown in drawing 23 from drawing 19.

[0032] As shown in drawing 1, the ink bottle case 62 where the ink bottle (it is an example of the 1st ink stores dept. said to this invention, and is the same as that of the ink bottle 16 shown in drawing 21.) was contained by ink jet method image formation equipment 60 is being fixed to

side-attachment-wall 60a. From the ink bottle contained by the ink bottle case 62, as shown in drawing 2, ink is supplied to a print head 20 through the ink supply tube 64, an ink cartridge 70, etc. Such ink supply mode is called 1st ink supply mode by this invention. On the other hand, supply of the ink from an ink bottle is intercepted and the ink supply mode which supplies only the ink stored in the ink cartridge 70 to a print head 20 is called 2nd ink supply mode ("using-up mode") by this invention.

[0033] The description of ink jet method image formation equipment 60 is in the point equipped with the change-over in the 2nd ink supply mode from the 1st ink supply mode, or the mode change-over member 80 which can perform this reverse change-over in one-touch. This mode change-over member 80 is the configuration which lengthened S characters, as shown in drawing 2, drawing 6, etc. Moreover, ink is stored, and the above-mentioned ink cartridge 70 is carried in a print head 20, and has structure with which the mode change-over member 80 is stopped.

[0034] As shown in drawing 2 or drawing 5, a print head 20 is carried in carriage 22. The hook 66 (it is an example of the holddown member said to this invention) for fixing a print head 20 to this carriage 22 is formed in carriage 22, and the print head 20 carried in carriage 22 is fixed to carriage 22 by hook 66.

[0035] Upper limit section 80a of the above-mentioned mode change-over member 80 is being fixed to the hook 66 by rotation shaft 66a free [ rotation ]. Two connection holes 82 and 84 are located in a line, and are formed in lower limit section 80b of the mode change-over member 80. Lock pawl 20b which fits into these two connection holes 82 and 84 alternatively, and is caught in them is formed in the print head 20. If lock pawl 20b is caught in the connection hole 82, it will become the 1st ink supply mode, and ink is supplied to a print head 20 through the ink supply tube 64, an ink cartridge 70, etc. from the ink bottle contained by the ink bottle case 62. On the other hand, if lock pawl 20b is caught in the connection hole 84, it will become the 2nd ink supply mode, and the ink supply tube 64 is crushed, the ink supply from an ink bottle is intercepted, and ink is supplied to a print head 20 only from an ink cartridge 70.

[0036] A location of the mode change-over member 80 where lock pawl 20b is caught in the connection hole 82 is an example of the 1st location said to this invention. A location of the mode change-over member 80 where lock pawl 20b is caught in the connection hole 84 is an example of the 2nd location said to this invention. Moreover, if the mode change-over member 80 is rotated up (the direction of arrow-head B) as shown in drawing 11, immobilization of hook 66 separates and a print head 20 can be removed from carriage 22. A location when the mode change-over member 80 rotates up is an example of the 3rd location said to this invention.

[0037] The mode change-over member 80 and print head 20 which were mentioned above are further explained to a detail.

[0038] As shown in drawing 4, drawing 5, etc., opening is formed in the lower part of a bridge wall although the ink cartridge 70 is divided into raw ink room 70a which stores ink in the state of the liquid, and sponge 70b stored in the condition of having made sponge absorbing ink. The ink stored in raw ink room 70a is drawn in sponge room 70b through opening by the negative pressure which originates in the regurgitation pulse of a print head 20, and is produced.

[0039] Free passage hole 70c which makes atmospheric air open this sponge room 70b for free passage is formed above sponge room 70b. Free passage hole 70c is formed with the configuration and a dimension from which the interior of an ink cartridge 70 will be in the optimal negative pressure condition.

[0040] The hole is formed above raw ink room 70a, and this hole is closed by joint shielding 70d in which the joint needle 86 (it is an example of the passage formation member said to this

invention) mentioned later is inserted. Joint shielding 70d is rubber material with a thickness of about 1mm. Although it is broken through with the joint needle 86 joint shielding 70d and a hole opens, this hole is closed by elastic contraction of rubber where the joint needle 86 is inserted.

[0041] As shown in drawing 4 , carriage 22 has electrode plate 22a for sending an ink regurgitation signal to a print head 20. Energization becomes possible when this electrode plate 22a contacts the contact section of a print head 20.

[0042] As mentioned above, the hook 66 is being fixed to carriage 22 free [ rotation ]. Turning effort is given in the direction which fixes a print head 20 to this hook 66 with a spring 68. Therefore, a print head 20 will be pressurized by hook 66, and will be fixed.

[0043] It turned caudad from the center section of the mode change-over member 80, and the joint needle 86 has projected. This joint needle 86 is being fixed to the mode change-over member 80 so that it may become the posture which can be inserted in joint shielding 70d. The upper limit section of the joint needle 86 is connected to the ink supply tube 64 piped from the ink bottle 16 (refer to drawing 21 ). The ink stored in the ink bottle 16 is supplied to an ink cartridge 70 through the ink supply tube 64 and the joint needle 86. In addition, hollow molding of the joint needle 86 is carried out at the bore of 1mm or less. At least one opening is formed in the point of the joint needle 86, and ink flows out of this opening.

[0044] The sealant 88 which closes and seals free passage hole 70c of an ink cartridge 70 is being fixed to the inferior surface of tongue of upper limit section 80a of the mode change-over member 80. Where lock pawl 20b of a print head 20 is hooked on the connection hole 82 of the mode change-over member 80, as shown in drawing 5 , a sealant 88 seals free passage hole 70c.

[0045] The compression coil spring 90 is being fixed near the fixed position of a sealant 88. When lock pawl 20b is caught in the connection holes 82 and 84 and an ink cartridge 70 is fixed to a print head 20, this compression coil spring 90 is constituted so that an ink cartridge 70 may be forced on a print head 20. By this, in both above-mentioned 1st and 2nd ink supply mode, positioning with the mode change-over member 80 and a print head 20 will be made.

[0046] The above-mentioned 1st ink supply mode is explained.

[0047] As mentioned above, in the 1st ink supply mode, ink is supplied to a print head 20 through the ink supply tube 64, an ink cartridge 70, etc. from the ink bottle contained by the ink bottle case 62. In this 1st ink supply mode, as shown in drawing 5 , lock pawl 20b is hooked on the connection hole 82. In this case, as shown in drawing 7 , the ink supply tube 64 is not crushed in the space inserted into the hook 66 and the mode selection member 80. Moreover, the joint needle 86 has broken through joint shielding 70d, and opening of the joint needle 86 is located in raw ink room 70a. Furthermore, free passage hole 70c is closed by the sealant 88. In the above condition, the ink cartridge 70 is in the airtight condition. Therefore, if ink is breathed out from ink delivery 20a of a print head 20 and sponge room 70b becomes negative pressure, ink will be supplied from an ink bottle via the joint needle 86 or the ink supply tube 64.

[0048] The above-mentioned 2nd ink supply mode is explained.

[0049] As mentioned above, in the 2nd ink supply mode, supply of the ink from an ink bottle is intercepted and only the ink stored in the ink cartridge 70 is supplied to a print head 20. This 2nd ink supply mode is also called "using-up mode." In switching to the 2nd ink supply mode from the 1st ink supply mode, the lever 89 located at the tip of the mode change-over member 80 is pulled up, lock pawl 20b is removed from the connection hole 82, and lock pawl 20b is hooked on the connection hole 84.

[0050] In the 2nd ink supply mode, since a compression coil spring 90 pushes up the mode change-over member 80, the mode change-over member 80 rotates up (in the direction of arrow-

head B), and is located in a high location compared with the time of the 1st ink supply mode. This high location is an example of the 2nd location said to this invention. Moreover, in the 2nd ink supply mode, the joint needle 86 escapes from and comes out of joint shielding 70d, and separates from raw ink room 70a of an ink cartridge 70. Furthermore, in the 2nd ink supply mode, it separates from free passage hole 70c, and thereby, the airtight condition of sponge room 70b is canceled, and sponge room 70b also opens for free passage outside the sealant 88 which had sealed free passage hole 70c.

[0051] Since the mode change-over member 80 rotates up as mentioned above, as shown in drawing 10, the ink supply tube 64 is crushed in the space inserted into the hook 66 and the mode selection member 80 (put). It puts, and an amount is this extent that crushes a part for the bore of the ink supply tube 64, and especially the thick section of the ink supply tube 64 is set as an amount which is not crushed.

[0052] In the 2nd ink supply mode, while separating the joint needle 86 from raw ink room 70a, free passage hole 70c is made to open wide, and further, it crushes so that ink may not pass along the ink supply tube 64. For this reason, it can prevent that the ink in the ink supply tube 64 which even the joint needle 86 is full of flows backwards to an ink bottle side with the change in the mode. Therefore, actuation of two processes will be once performed to coincidence by actuation.

[0053] Actuation of removing a print head 20 from carriage 22 is explained.

[0054] The mode change-over member 80 is rotated rather than the location at the time of the 2nd ink supply mode to an upper (the direction of arrow-head B) location (it is an example of the 3rd location said to this invention). Tube-guide 64a pushes hook 66, the ink supply tube 64 putting and maintaining a condition by this rotation. Thereby, as shown in drawing 11, hook 66 also rotates in the direction of arrow-head B. Under the hook 66, lever 66b in contact with the side face of a print head 20 is formed, and this lever 66b extrudes a print head 20. Consequently, while the lock of the hook 66 which is fixing the print head 20 is canceled and being able to remove a print head 20 from carriage 22, an ink cartridge 70 can also be removed.

[0055] From drawing 12 to drawing 18 is referred to, and the 2nd operation gestalt of the ink jet method image formation equipment of this invention is explained.

[0056] Drawing 12 is the mimetic diagram showing the ink supply mode which supplies ink to a print head from an ink bottle in the ink jet method image formation equipment of the 2nd operation gestalt. Drawing 13 is the perspective view showing appearances, such as a print head at the time of the mode of drawing 12. Drawing 14 is the perspective view showing the joint base connected with the print head. Drawing 15 is the sectional view showing the configuration of a joint base. Drawing 16 is the perspective view showing the configuration of a joint base. Drawing 17 is the mimetic diagram showing the mode which intercepted the ink supply from an ink bottle. Drawing 18 is the mimetic diagram showing the mode which can take out a print head from carriage. In these drawings, the same sign is given to the same component as the component shown in drawing 11 from drawing 1.

[0057] As shown in drawing 12, the ink bottle case 62 (refer to drawing 1) where the ink bottle (it is an example of the 1st ink stores dept. said to this invention, and is the same as that of the ink bottle 16 shown in drawing 21.) was contained by ink jet method image formation equipment 100 is being fixed to the side attachment wall (not shown). Ink is supplied to a print head 20 through the ink supply tube 102, an ink cartridge 110, etc. from the ink bottle contained by the ink bottle case 62. Such ink supply mode is called 1st ink supply mode by this invention. On the other hand, supply of the ink from an ink bottle is intercepted and the ink supply mode which supplies only the ink stored in the ink cartridge 110 to a print head 20 is called 2nd ink

supply mode ("using-up mode") by this invention.

[0058] The description of ink jet method image formation equipment 100 is in the point equipped with the change-over in the 2nd ink supply mode from the 1st ink supply mode, or the mode change-over member 120 which can perform this reverse change-over in one-touch. The joint base 140 mentioned later is built into this mode change-over member 120. Moreover, ink is stored, and the above-mentioned ink cartridge 110 is carried in a print head 20, and has structure with which the mode change-over member 120 is stopped.

[0059] As shown in drawing 12 or drawing 17, a print head 20 is carried in carriage 22. The hook 66 (it is an example of the holddown member said to this invention) for fixing a print head 20 to this carriage 22 is formed in carriage 22, and the print head 20 carried in carriage 22 is fixed to carriage 22 by hook 66.

[0060] End section 120a of the above-mentioned mode change-over member 120 is being fixed to the hook 66 by rotation shaft 66a free [ rotation ]. The connection hole 122 is formed in other end 120b of the mode change-over member 120. Lock pawl 20b which fits into this connection hole 122 and is caught in it is formed in the print head 20. If lock pawl 20b is caught in the connection hole 122, it will become the 1st ink supply mode, and ink is supplied to a print head 20 through the ink supply tube 102, an ink cartridge 110, etc. from the ink bottle contained by the ink bottle case 62. On the other hand, if lock pawl 20b separates from the connection hole 122, it will become the 2nd ink supply mode, and the ink supply from the ink bottle contained by the ink bottle case 62 is intercepted, and ink is supplied to a print head 20 only from an ink cartridge 110.

[0061] A location of the mode change-over member 120 where lock pawl 20b is caught in the connection hole 122 is an example of the 1st location said to this invention. The location of the mode change-over member 120 from which lock pawl 20b separates from the connection hole 122 is an example of the 2nd location said to this invention. Moreover, if the mode change-over member 120 is rotated up (the direction of arrow-head B) as shown in drawing 18, immobilization of hook 66 separates and a print head 20 can be removed from carriage 22. A location when the mode change-over member 120 rotates up is an example of the 3rd location said to this invention.

[0062] The mode change-over member 120 and print head 20 which were mentioned above are further explained to a detail.

[0063] As shown in drawing 12, drawing 14, etc., opening is formed in the lower part of a bridge wall although the ink cartridge 110 is divided into raw ink room 110a which stores ink in the state of the liquid, and sponge 110b stored in the condition of having made sponge absorbing ink. The ink stored in raw ink room 110a is drawn in sponge room 110b through opening by the negative pressure which originates in the regurgitation pulse of a print head 20, and is produced.

[0064] Free passage hole 110c which makes atmospheric air open this sponge room 110b for free passage is formed above sponge room 110b. Free passage hole 110c is formed with the configuration and a dimension from which the interior of an ink cartridge 110 will be in the optimal negative pressure condition.

[0065] The connection section 112 connected with the joint base 140 is formed in the upper part of raw ink room 110a. Ink passage 112a which is open for free passage to raw ink room 110a is formed in this connection section 112. It is closed by joint shielding 112b by which the joint needle 142 (it is an example of the passage formation member said to this invention) mentioned later is inserted in opening of ink passage 112a. Joint shielding 112b is rubber material with a thickness of about 1mm. Although joint shielding 112b is broken through with the joint needle

142 and a hole opens it, this hole is closed by elastic contraction of rubber where the joint needle 142 is inserted.

[0066] As mentioned above, the hook 66 is being fixed to carriage 22 free [ rotation ]. Turning effort is given in the direction which fixes a print head 20 to this hook 66 with a spring 68.

Therefore, a print head 20 will be pressurized by hook 66, and will be fixed.

[0067] As shown in drawing 16 , along with the longitudinal direction (the height direction of the joint base 140), the joint needle 142 (it is an example of the passage formation member said to this invention) is being fixed to the interior of the joint cylinder-like base 140. Hole 142a of a large number into which ink flows is formed in the point of the joint needle 142. The back end section of the joint needle 142 is connected to the ink supply tube 102.

[0068] Moreover, the fixed wall 144 is formed in 2/3 of the locations of the die-length direction of the joint base 140. The point side of the joint needle 142 is a cylinder-like cavity from this fixed wall 144. The compression coil spring 146 is inserted in this cavity, and that back end section is in contact with the fixed wall 144. Moreover, the slider 148 of the shape of a cylinder exactly inserted in the interior of the cavity of the joint base 140 is in contact with the point of a compression coil spring 146. The sponge material 150 is stuffed into the interior of this slider 148. For this reason, the peripheral face of the sponge material 150 is covered with a slider 148. The slider 148 is manufactured with the ingredient with low coefficient of friction to the joint base 140. The die length (height) of a slider 148 is the quadrant grade of the die length of the cavity of the joint base 140.

[0069] Along with the longitudinal direction, the hole a little smaller than the outer diameter of the joint needle 142 is formed in the center section of the sponge material 148. The joint needle 142 is inserted in this hole.

[0070] The above-mentioned slider 148 is energized by the spring force (energization force) of a compression coil spring 146 towards opening 140a of the joint base 140. Stopper 140b is formed in this opening 140a so that a slider 148 may not fall out. When the slider 148 is located near the opening 140a, the sponge material 150 has covered the point of the joint needle 142, and, for this reason, hole 142a of the joint needle 142 is closed by the sponge material 150.

[0071] On the other hand, when the force in which a compression coil spring 146 is contracted acts on a slider 148, a slider 148 moves in the inner part of the joint base 140 with the sponge material 150. Thereby, hole 142a of the joint needle 142 is exposed. In addition, hollow molding of the joint needle 142 is carried out at the bore of 1mm or less. Moreover, ink flows out of hole 142a formed in the point of the joint needle 142.

[0072] The sealant 124 which closes and seals free passage hole 110c of an ink cartridge 110 is being fixed to the inferior surface of tongue near the upper limit section 120a of the mode change-over member 120. Where lock pawl 20b of a print head 20 is hooked on the connection hole 122 of the mode change-over member 120, as shown in drawing 12 , a sealant 124 seals free passage hole 110c.

[0073] The above-mentioned 1st ink supply mode is explained.

[0074] As mentioned above, in the 1st ink supply mode, ink is supplied to a print head 20 through the ink supply tube 102, an ink cartridge 110, etc. from the ink bottle contained by the ink bottle case 62. In this 1st ink supply mode, as shown in drawing 17 , lock pawl 20b is hooked on the connection hole 122. In this case, the joint base 140 runs against the connection section 112, the force in which a compression coil spring 146 is contracted acts on a slider 148, and a slider 148 moves in the inner part of the joint base 140 with the sponge material 150. Thereby, hole 142a of the joint needle 142 is exposed within ink passage 112a of the connection section



112, and an ink bottle and raw ink room 110a are connected.

[0075] In addition, in this condition, the locking lever 152 (refer to drawing 14) formed in the point of the joint base 140 is run and fixed to the stopper 126 formed in the mode change-over member 120. Moreover, free passage hole 110c will be sealed by the sealant 124, the interior of an ink cartridge 110 will be maintained at the optimal negative pressure condition, and ink will be supplied.

[0076] The above-mentioned 2nd ink supply mode is explained.

[0077] As mentioned above, in the 2nd ink supply mode, supply of the ink from an ink bottle is intercepted and only the ink stored in the ink cartridge 110 is supplied to a print head 20. This 2nd ink supply mode is also called "using-up mode." In switching to the 2nd ink supply mode from the 1st ink supply mode, the lever 128 located at the tip of the mode change-over member 120 is pulled up, and lock pawl 20b is removed from the connection hole 122. Thereby, the locking lever 152 of the joint base 140 is depressed, and it moves in the direction in which the joint base 140 separates from the connection section 112 according to the energization force of a compression coil spring 146.

[0078] The sealing condition of free passage hole 110c is canceled, and sponge room 110b is open for free passage to atmospheric air with this migration. Moreover, the joint needle 142 escapes from and comes out of sealant 112b, and hole 142a of the joint needle 142 is closed by the sponge material 150. Therefore, the ink supply from an ink bottle is intercepted such in a condition. Moreover, since hole 142a of the joint needle 142 is closed by the sponge material 150, the ink from the ink bottle in the ink supply tube 102 interior to the joint needle 142 does not flow backwards in an ink bottle.

[0079] Actuation of removing a print head 20 from carriage 22 is explained.

[0080] The lever 128 of the mode change-over member 120 is pulled up highly, and a medial axis is made to rotate the mode change-over member 120 by carrying out rotation shaft 66a. By this rotation, as shown in drawing 18, hook 66 also rotates in the direction of arrow-head B focusing on rotation shaft 66a. Under the hook 66, lever 66c in contact with the side face of a print head 20 is formed, and this lever 66c extrudes a print head 20. Consequently, while the lock of the hook 66 which is fixing the print head 20 is canceled and being able to remove a print head 20 from carriage 22, an ink cartridge 110 can also be removed.

[0081] With the 1st and 2nd operation gestalt mentioned above, in case it switches to the 1st ink supply mode or the 2nd ink supply mode, a user moves the mode change-over member 80,120 by hand. When the automatic switchover device and controller (control device) which can move this mode change-over member 80,120 automatically are built into ink jet method image formation equipment, based on the residue ink detection signal which supports the residue of the ink stored in the ink bottle 16, ink jet method image formation equipment moves a connection member automatically, and is switched to the 2nd ink supply mode (using-up mode) from the 1st ink supply mode. For this reason, an operator does not need to perform change actuation, without interrupting printing actuation also in image printing. Therefore, without caring about the ink piece of the ink bottle 16, since printing actuation is continuable, operability improves, and user-friendly ink jet method image formation equipment is obtained.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the appearance of the ink jet method image

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formation equipment of the 1st operation gestalt of this invention.

[Drawing 2] It is the mimetic diagram showing the internal configuration of the ink jet method image formation equipment of drawing 1 .

[Drawing 3] It is the perspective view showing the appearance of the print head of drawing 2 .

[Drawing 4] The print head of drawing 3 is the mimetic diagram showing the fixed condition fixed to carriage.

[Drawing 5] It is the mimetic diagram showing the ink supply condition which supplies ink to a print head from an ink bottle.

[Drawing 6] It is the perspective view showing the 1st ink supply mode.

[Drawing 7] It is the mimetic diagram showing the tube in the condition (the 1st ink supply mode) that ink can be supplied from an ink bottle.

[Drawing 8] It is the perspective view showing the 2nd ink supply mode.

[Drawing 9] It is the mimetic diagram showing the 2nd ink supply mode.

[Drawing 10] It is the mimetic diagram showing the tube in the condition (the 2nd ink supply mode) that supply of the ink from an ink bottle was intercepted.

[Drawing 11] It is the mimetic diagram showing the condition that a mode selection member is located in the 3rd location, and can remove a print head.

[Drawing 12] It is the mimetic diagram showing the ink supply mode which supplies ink to a print head from an ink bottle in the ink jet method image formation equipment of the 2nd operation gestalt of this invention.

[Drawing 13] It is the perspective view showing appearances, such as a print head at the time of the mode of drawing 12 .

[Drawing 14] It is the perspective view showing the joint base connected with the print head.

[Drawing 15] It is the sectional view showing the configuration of a joint base.

[Drawing 16] It is the perspective view showing the configuration of a joint base.

[Drawing 17] It is the mimetic diagram showing the mode which intercepted the ink supply from an ink bottle.

[Drawing 18] It is the mimetic diagram showing the mode which can take out a print head from carriage.

[Drawing 19] It is the perspective view showing the ink jet printer which is an example of conventional ink jet method image formation equipment.

[Drawing 20] It is the mimetic diagram showing the internal structure of the ink jet printer of drawing 19 .

[Drawing 21] It is the mimetic diagram showing a tubing method.

[Drawing 22] It is the mimetic diagram showing the ink cartridge in which the needle unit was attached.

[Drawing 23] It is the mimetic diagram showing the ink cartridge from which the needle unit was removed.

[Description of Notations]

16 Ink Bottle

20 Print Head

20b Lock pawl

22 Carriage

60,100 Ink jet method image formation equipment

64,102 Ink supply tube

66 Hook

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70,110 Ink cartridge  
80,120 Mode change-over member  
82 84,122 Connection hole  
86 Joint Needle

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[Translation done.]

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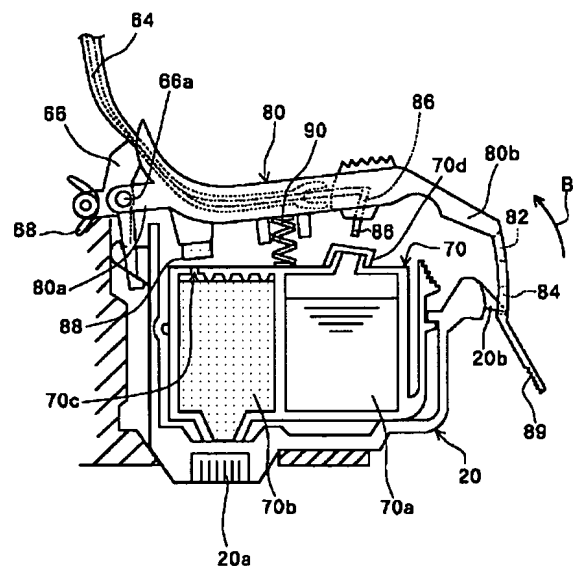
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(54) 【発明の名称】 インクジェット方式画像形成装置

(57) 【要約】

【課題】 「インク使い切りモード」への切換えを、容易にかつ確実にこなえるインクジェット方式画像形成装置を提供する。

【解決手段】 第1インク供給モードから第2インク供給モードに切り換えるに当たっては、レバー89を引き上げて引掛孔82からロック爪20bを外して、引掛孔84にロック爪20bを引っ掛ける。これにより、ジョイント針86がジョイントシールド70dから抜け出てインクカートリッジ70の生インク室70aから離れる。さらに、第2インク供給モードでは、連通孔70cを密閉していたシール材88も連通孔70cから離れ、スポンジ室70bの気密状態が解除されてスポンジ室70bが外部に連通する。



【特許請求の範囲】

【請求項１】 所定の主走査方向に往復動するキャリッジと、該キャリッジとは異なる位置に配置されてインクを貯蔵する第１インク貯蔵部と、前記キャリッジに搭載される印字ヘッドに装着されて該印字ヘッドに供給されるインクを貯蔵する第２インク貯蔵部と、前記第１インク貯蔵部から前記第２インク貯蔵部に供給されるインクが通るチューブとを備え、前記第１インク貯蔵部から前記第２インク貯蔵部を経由して前記印字ヘッドにインクを供給する第１インク供給モード、及び前記第１インク貯蔵部からのインク供給を遮断して前記第２インク貯蔵部から前記印字ヘッドにインクを供給する第２インク供給モード双方のモードが選択されるインクジェット方式画像形成装置において、前記印字ヘッドを前記キャリッジに固定する固定部材と、

所定の第１の位置に位置したときに前記第１インク供給モードが選択され、前記第１の位置とは異なる第２の位置に位置したときに前記第２インク供給モードが選択される、前記固定部材に取り付けられたモード選択部材を備えたことを特徴とするインクジェット方式画像形成装置。

【請求項２】 前記モード選択部材は、前記第１及び第２の位置とは異なる第３の位置に位置したときに、前記固定部材によって前記キャリッジに固定された前記印字ヘッドの固定を解除するものであることを特徴とする請求項１に記載の印字ヘッド。

【請求項３】 前記チューブは、前記固定部材と前記モード選択部材に挟まれた空間を通過するものであり、前記モード選択部材は、該モード選択部材が前記第１の位置に位置するときには前記チューブを押し潰さずに該チューブ内をインクが流れるようにするものであり、該モード選択部材が前記第２の位置に位置するときには前記チューブを押し潰して該チューブ内をインクが流れないようにするものであることを特徴とする請求項１又は２に記載のインクジェット方式画像形成装置。

【請求項４】 前記モード選択部材が前記第１の位置に位置するときには前記第２インク貯蔵部に接続されて該第２インク貯蔵部にインクを流し出し、前記モード選択部材が前記第２の位置に位置するときには前記第２インク貯蔵部から離れる、前記チューブの端部に接続された流路形成部材を備えたことを特徴とする請求項１，２，又は３に記載のインクジェット方式画像形成装置。

【請求項５】 前記流路形成部材は、インクが流れ出る開口が形成されたものであり、前記モード選択部材が前記第２の位置に位置するときには前記開口を密閉する密閉部材を備えたことを特徴とする請求項４に記載のインクジェット方式画像形成装置。

【請求項６】 前記第１及び第２インク供給モードに応じて前記流路形成部材の前記開口が開閉されるように該流路形成部材を制御する制御器を備えたことを特徴とする請求項４又は５に記載のインクジェット方式画像形成装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、記録媒体にインクを吐出して画像を形成するインクジェット方式画像形成装置に関する。

【０００２】

【従来の技術】コンピュータやワークステーションの出力装置の一つとして、記録媒体にインクを吐出して画像を形成するインクジェット方式の画像形成装置が知られている。

【０００３】このインクジェット方式画像形成装置の一例を、図１９と図２０を参照して説明する。

【０００４】図１９は、従来のインクジェット方式画像形成装置の一例であるインクジェットプリンタを示す斜視図である。図２０は、図１９のインクジェットプリンタの内部構造を示す模式図である。

【０００５】図１９に示すように、インクジェットプリンタ１０には、このインクジェットプリンタ１０を操作するための操作部１２が形成されている。操作部１２に配置された各種スイッチ等によって、紙種、オンライン／オフライン、コマンドなどが指示される。また、インクジェットプリンタ１０には、記録媒体が挿入されると共に排出される開口１４が形成されている。この開口１４から記録媒体の先端を挿入することによりこの記録媒体がインクジェットプリンタ１０の内部に搬送され、その内部で記録媒体に画像が形成される。記録媒体のうち画像の形成された部分は開口１４から矢印Ａ方向に排出されてバスケット（図示せず）などに収容される。なお、インクジェットプリンタ１０の側壁１０ａには、インクが貯蔵されたインクボトル１６（図２１参照）が収容されるボトルケース１８が固定されている。

【０００６】インクジェットプリンタ１０は、図２０に示すように、インクが吐出する複数のインク吐出口２０ａが形成された印字ヘッド２０と、この印字ヘッド２０を搭載して主走査方向（図２０の紙面に垂直な方向）に往復動するキャリッジ２２と、この主走査方向に直交する矢印Ａ方向（記録紙搬送方向であり、副走査方向という）に記録媒体を断続的に搬送する駆動ローラ２４及びピンチローラ２６とを備えている。ピンチローラ２６はピンチローラアーム３２やコイルばね３４を介して、駆動ローラ２４から自在に接離できるようにガイドステー３６に固定されている。

【０００７】また、インクジェットプリンタ１０には、記録媒体が載置されるプラテン２８が配置されている。このプラテン２８のうち印字ヘッド２０の前方部分は、

画像が形成される画像形成領域である。記録媒体のうちこの画像形成領域に位置する部分（以下、画像形成部分という）は、吸引ファン30が空気吸引孔28aから空気を吸引することによりプラテン28に密着する。

【0008】記録媒体に画像を形成する際は、駆動ローラ24とピンチローラ26で搬送中の記録媒体を一時的に停止させ、キャリッジ22を上記の主走査方向に往復動させながら、記録媒体の画像形成部分に印字ヘッド20からインクを吐出して1バンド分の画像を形成する（印字する）。その後、所定長さだけ記録媒体を搬送して画像形成領域に新たに位置する画像形成部分に次のバンド分の画像を形成する動作を繰り返す。

【0009】なお、キャリッジ22の移動可能な範囲の片側であって、画像形成領域から離れた位置には、インク吐出口20aからインクを強制的に吸引してインク吐出口20aからのインク吐出状態を初期と同等の吐出状態にする回復装置（図示せず）が配置されている。画像形成動作中、インク吐出状態を初期の吐出状態に回復させることが必要な状態になると、キャリッジ22を回復装置の上方に移動させ、インク吐出口20aからインクを強制的に吸引する。

【0010】印字ヘッド20には、インクが貯蔵されたインクカートリッジ40が装着されている。このインクカートリッジ40に貯蔵されたインクは印字ヘッド20に供給されてインク吐出口20aから吐出される。インクカートリッジ40は、インクを液体のまま貯蔵しておく生インク室40aと、インクを吸収するスポンジなどにインクを吸収させた状態で貯蔵しておくインク吸収体室40bとの2室に分けられている。

【0011】インクカートリッジ40には、キャリッジ22とは異なる位置に固定されたインクボトル16（図21参照）からインク供給チューブ38を通してインクが供給される。インク供給チューブ38の先端には、インクが流れ出る針42が固定された針ユニット44が取り付けられている。このようにインクボトル16からインク供給チューブ38やインクカートリッジ40を通して印字ヘッド20にインクを供給する方式をチューピング方式という。このチューピング方式について、図21から図23までを参照して説明する。

【0012】図21は、チューピング方式を示す模式図である。図22は、針ユニットが取り付けられたインクカートリッジを示す模式図である。図23は、針ユニットが取り外されたインクカートリッジを示す模式図である。

【0013】インク吐出口20aから吐出されて画像形成に使用されるインクは、一色毎にインクボトル16に貯蔵されている。このインクボトル16は、上述したように、ボトルケース18（図19参照）に搭載される。ボトルケース18内には、インクボトル16に貯蔵されているインクを一旦貯蔵するインクバッファ46が備え

られている。このインクバッファ46のインク液面内には、インクを取り込むための針48が挿入されている。この針48は、樹脂製のインク供給チューブ38の端部に結合されている。

【0014】インク供給チューブ38は、ガイドステー36（図20参照）に平行に設けられたチューブガイド（図示せず）に沿ってキャリッジ22まで配管されている。なお、キャリッジ22が往復動する際には、このインク供給チューブ38はキャリッジ22の位置に従って自在に変化し、キャリッジ22の往復動に影響を与えないように構成されている。

【0015】キャリッジ22に配管されたインク供給チューブ38の先端部には、上述したように針42が固定された針ユニット44が結合されている。この針ユニット44はインクカートリッジ40に密閉結合されている。これにより、インクボトル16内に貯蔵されたインク50がインクバッファ46に所定量だけ貯蔵された後、インク供給チューブ38を経由してインクカートリッジ40に供給される。

【0016】インク吐出口20aからは一回に所定量のインクが吐出される。インク吐出口20aからインクが吐出されると、このインク吐出に起因してインクカートリッジ40内の気圧が負圧状態となる。この負圧状態によって、インクバッファ46のインクがインク供給チューブ38を通して、インクカートリッジ40内に位置する針42の孔から流れ出る。

【0017】インク吐出口20aから何度もインクが吐出されると、インクバッファ46のインクやインクボトル16に貯蔵されているインクが徐々に消費される。インクジェットプリンタ10（図20参照）には、インクボトル16内のインク残量を検知するインク残量検知器（図示せず）が設置されている。このインク残量検知器が、インクボトル16にインク残量が無いことを検知すると、制御部（図示せず）から発せられるインク無し信号に基づいて、操作部12（図19参照）にインク無しメッセージが表示される。

【0018】この場合、図23に示すように、キャリッジ22に取り付けられたコック52を用いてインク供給チューブ38を潰し、このインク供給チューブ38内のインクがインクボトル16の方へ逆流しないようにする。このようにコック52でインク供給チューブ38を潰したままの状態、インクカートリッジ40に結合されている針ユニット44がインクカートリッジ40から取り外される。取り外された針ユニット44は、キャリッジ22に形成されたジョイントホルダ22aに差し込まれて保管される。

【0019】針ユニット44がインクカートリッジ40から取り外されることによりインクカートリッジ40が外部に連通して大気圧になるので、インクカートリッジ40に残っているインクを用いて画像形成動作を継続で

きる。このようにインクボトル16に貯蔵されたインクを使い終わった後に、インクカートリッジ40に貯蔵されているインクを使い切るようなモードを、チューピング方式のインクジェット方式画像形成装置においては、一般に「インク使い切りモード」として知られている。なお、インクカートリッジ40内のインクが無くなると、インクカートリッジ40が装着された印字ヘッド20及びインクボトル16双方を新品に交換することとなる。

#### 【0020】

【発明が解決しようとする課題】上記した「インク使い切りモード」への切換え操作は、操作者によって適宜に行なわれる。この切換え操作の操作項目は2つある。一番目は、インク逆流防止用のコック52を閉じる。二番目に、針ユニット44をインクカートリッジ40から取り外してジョイントホルダ22aに差し込む。このうち二番目の操作は、針ユニット44が数キログラム程度の結合力でインクカートリッジ40に接続（ジョイント）されているので、針ユニット44をインクカートリッジ40から非常に取り外しにくい。

【0021】また、針ユニット44をインクカートリッジ40から取り外すために引き抜く際に、操作者は針ユニット44を直接に掴む。このため、針42が変形したり、針ユニット44とインクカートリッジ40の間を密封する（シールする）ジョイントシール材が傷付いて破損したり、手や衣服にインクが付着したりすることがある。従って、このようなトラブルが生じないように注意しながら作業する必要がある。

【0022】さらに、複数色のインクを用いてカラー印字を行う画像記録装置では、上記の操作を印字ヘッドの数だけ行う必要がある。このため、操作する手間と時間が増えることとなり非常に煩わしい作業となる。

【0023】本発明は、上記事情に鑑み、上述した「インク使い切りモード」への切換えを、容易にかつ確実に行えるインクジェット方式画像形成装置を提供することを目的とする。

#### 【0024】

【課題を解決するための手段】上記目的を達成するための本発明のインクジェット方式画像形成装置は、所定の主走査方向に往復動するキャリッジと、該キャリッジとは異なる位置に配置されてインクを貯蔵する第1インク貯蔵部と、前記キャリッジに搭載される印字ヘッドに装着されて該印字ヘッドに供給されるインクを貯蔵する第2インク貯蔵部と、前記第1インク貯蔵部から前記第2インク貯蔵部に供給されるインクが通るチューブとを備え、前記第1インク貯蔵部から前記第2インク貯蔵部を経由して前記印字ヘッドにインクを供給する第1インク供給モード、及び前記第1インク貯蔵部からのインク供給を遮断して前記第2インク貯蔵部から前記印字ヘッドにインクを供給する第2インク供給モード双方のモードが選択されるインクジェット方式画像形成装置におい

て、（1）前記印字ヘッドを前記キャリッジに固定する固定部材と、（2）所定の第1の位置に位置したときに前記第1インク供給モードが選択され、前記第1の位置とは異なる第2の位置に位置したときに前記第2インク供給モードが選択される、前記固定部材に取り付けられたモード選択部材を備えたことを特徴とするものである。

【0025】ここで、前記モード選択部材は、（3）前記第1及び第2の位置とは異なる第3の位置に位置したときに、前記固定部材によって前記キャリッジに固定された前記印字ヘッドの固定を解除するものであってもよい。

【0026】また、（4）前記チューブは、前記固定部材と前記モード選択部材に挟まれた空間を通過するものであり、（5）前記モード選択部材は、該モード選択部材が前記第1の位置に位置するときには前記チューブを押し潰さずに該チューブ内をインクが流れるようにするものであり、（6）該モード選択部材が前記第2の位置に位置するときには前記チューブを押し潰して該チューブ内をインクが流れないようにするものであってもよい。

【0027】さらに、上記のインクジェット方式画像形成装置は、（7）前記モード選択部材が前記第1の位置に位置するときは前記第2インク貯蔵部に接続されて該第2インク貯蔵部にインクを流し出し、前記モード選択部材が前記第2の位置に位置するときは前記第2インク貯蔵部から離れる、前記チューブの端部に接続された流路形成部材を備えてもよい。

【0028】さらにまた、（8）前記流路形成部材は、インクが流れ出る開口が形成されたものであり、（9）上記インクジェット方式画像形成装置は、前記モード選択部材が前記第2の位置に位置するときは前記開口を密閉する密閉部材を備えてもよい。

【0029】さらにまた、上記インクジェット方式画像形成装置は、（10）前記第1及び第2インク供給モードに応じて前記流路形成部材の前記開口が開閉されるように該流路形成部材を制御する制御器を備えてもよい。

#### 【0030】

【発明の実施の形態】図面を参照して本発明のインクジェット方式画像形成装置の実施形態を説明する。図1から図11までを参照して第1実施形態を説明する。

【0031】図1は、第1実施形態のインクジェット方式画像形成装置の外観を示す斜視図である。図2は、図1のインクジェット方式画像形成装置の内部構成を示す模式図である。図3は、図2の印字ヘッドの外観を示す斜視図である。図4は、図3の印字ヘッドがキャリッジに固定された固定状態を示す模式図である。図5は、インクボトルから印字ヘッドにインクを供給するインク供給状態を示す模式図である。図6は、第1インク供給モードを示す斜視図である。図7は、インクボトルからイ

ンクを供給できる状態（第1インク供給モード）のチューブを示す模式図である。図8は、第2インク供給モードを示す斜視図である。図9は、第2インク供給モードを示す模式図である。図10は、インクボトルからのインクの供給が遮断された状態（第2インク供給モード）のチューブを示す模式図である。図11は、モード選択部材が第3の位置に位置して印字ヘッドを取り外せる状態を示す模式図である。これらの図では、図19から図23に示す構成要素と同一の構成要素には同一の符号が付されている。

【0032】図1に示すように、インクジェット方式画像形成装置60には、インクボトル（本発明にいう第1インク貯蔵部の一例であり、図21に示すインクボトル16と同様のものである。）が収納されたインクボトルケース62が側壁60aに固定されている。インクボトルケース62に収納されたインクボトルから、図2に示すように、インク供給チューブ64やインクカートリッジ70などを介して印字ヘッド20にインクが供給される。このようなインク供給モードを本発明では第1インク供給モードという。一方、インクボトルからのインクの供給を遮断して、インクカートリッジ70に貯蔵されているインクだけを印字ヘッド20に供給するインク供給モードを本発明では第2インク供給モード（「使い切りモード」）という。

【0033】インクジェット方式画像形成装置60の特徴は、第1インク供給モードから第2インク供給モードへの切換、もしくはこの逆の切換をワンタッチでできるモード切換部材80を備えた点にある。このモード切換部材80は、図2や図6などに示すように、S字を伸ばしたような形状である。また、上記したインクカートリッジ70は、インクが貯蔵されて印字ヘッド20に搭載されるものであり、モード切換部材80が係止されるような構造になっている。

【0034】図2や図5に示すように、キャリッジ22には印字ヘッド20が搭載される。キャリッジ22には、印字ヘッド20をこのキャリッジ22に固定するためのフック66（本発明にいう固定部材の一例である）が形成されており、キャリッジ22に搭載された印字ヘッド20はフック66によってキャリッジ22に固定される。

【0035】フック66には、上記のモード切換部材80の上端部80aが回転軸66aによって回転自在に固定されている。モード切換部材80の下端部80bには、2つの引掛孔82、84が並んで形成されている。これら2つの引掛孔82、84に選択的に嵌り込んで引掛かるロック爪20bが印字ヘッド20に形成されている。引掛孔82にロック爪20bが引掛かると第1インク供給モードとなり、インクボトルケース62に収納されたインクボトルからインク供給チューブ64やインクカートリッジ70などを介して印字ヘッド20にイ

ンクが供給される。一方、引掛孔84にロック爪20bが引掛かると第2インク供給モードとなり、インク供給チューブ64が押し潰されてインクボトルからのインク供給が遮断され、インクカートリッジ70だけから印字ヘッド20にインクが供給される。

【0036】引掛孔82にロック爪20bが引掛かるようなモード切換部材80の位置が、本発明にいう第1の位置の一例である。引掛孔84にロック爪20bが引掛かるようなモード切換部材80の位置が、本発明にいう第2の位置の一例である。また、図11に示すように、モード切換部材80を上方（矢印B方向）に回転させると、フック66の固定が外れて印字ヘッド20をキャリッジ22から取り外せる。モード切換部材80が上方に回転したときの位置は、本発明にいう第3の位置の一例である。

【0037】上述したモード切換部材80や印字ヘッド20についてさらに詳細に説明する。

【0038】図4や図5などに示すように、インクカートリッジ70は、インクを液体の状態では貯蔵しておく生インク室70aと、スポンジにインクを吸収させた状態で貯蔵しておくスポンジ70bとに仕切られているが、仕切壁の下部には開口が形成されている。生インク室70aに貯蔵されているインクは、印字ヘッド20の吐出パルスに起因して生じる負圧力によって、開口を通してスポンジ室70bに引き込まれる。

【0039】スポンジ室70bの上方には、このスポンジ室70bを大気に連通させる連通孔70cが形成されている。連通孔70cは、インクカートリッジ70の内部が最適な負圧状態になるような形状・寸法で形成されている。

【0040】生インク室70aの上方には孔が形成されており、この孔は、後述するジョイント針86（本発明にいう流路形成部材の一例である）が差し込まれるジョイントシールド70dで塞がれている。ジョイントシールド70dは1ミリ程度の厚さのゴム材である。ジョイントシールド70dはジョイント針86によって突き破られて孔が開くが、この孔は、ジョイント針86が差し込まれた状態ではゴムの弾性収縮によって塞がれる。

【0041】図4に示すように、キャリッジ22は、印字ヘッド20にインク吐出信号を送るための電極板22aを有している。この電極板22aが印字ヘッド20のコンタクト部に接触することにより通電可能となる。

【0042】上述したようにフック66はキャリッジ22に回転自在に固定されている。このフック66には、ばね68によって印字ヘッド20を固定する方向に回転力が与えられている。従って、印字ヘッド20はフック66により加圧され固定されていることとなる。

【0043】モード切換部材80の中央部から下方に向けてジョイント針86が突き出ている。このジョイント針86はジョイントシールド70dに差し込める姿勢に



なるようにモード切換部材80に固定されている。ジョイント針86の上端部は、インクボトル16（図21参照）から配管されているインク供給チューブ64に接続されている。インクボトル16に貯蔵されているインクはインク供給チューブ64とジョイント針86を通してインクカートリッジ70に供給される。なお、ジョイント針86は、内径1ミリ以下に中空成型されている。ジョイント針86の先端部には少なくとも一つの開口が形成されており、この開口からインクが流れ出る。

【0044】モード切換部材80の上端部80aの下面には、インクカートリッジ70の連通孔70cを塞いで密閉するシール材88が固定されている。モード切換部材80の引掛孔82に印字ヘッド20のロック爪20bを引っ掛けた状態では、図5に示すように、シール材88が連通孔70cを密閉する。

【0045】シール材88の固定位置の近傍には圧縮コイルばね90が固定されている。この圧縮コイルばね90は、引掛孔82、84にロック爪20bが引っ掛けてインクカートリッジ70が印字ヘッド20に固定されたときに、インクカートリッジ70を印字ヘッド20に押し付けるように構成されている。これにより、上記した第1及び第2インク供給モード双方において、モード切換部材80と印字ヘッド20との位置決めがなされることとなる。

【0046】上記した第1インク供給モードについて説明する。

【0047】上述したように第1インク供給モードでは、インクボトルケース62に収納されたインクボトルからインク供給チューブ64やインクカートリッジ70などを介して印字ヘッド20にインクが供給される。この第1インク供給モードでは、図5に示すように、引掛孔82にロック爪20bが引っ掛けられる。この場合、図7に示すように、インク供給チューブ64はフック66とモード選択部材80に挟まれた空間で押し潰されていない。また、ジョイント針86はジョイントシールド70dを突き破っており、ジョイント針86の開口は、生インク室70aに位置している。さらに、連通孔70cがシール材88によって塞がれている。上記のような状態ではインクカートリッジ70が気密状態になっている。従って、印字ヘッド20のインク吐出口20aからインクが吐出されてスポンジ室70bが負圧になると、ジョイント針86やインク供給チューブ64を経由してインクボトルからインクが供給される。

【0048】上記した第2インク供給モードについて説明する。

【0049】上述したように、第2インク供給モードでは、インクボトルからのインクの供給が遮断されて、インクカートリッジ70に貯蔵されているインクだけが印字ヘッド20に供給される。この第2インク供給モードは「使い切りモード」とも呼ばれる。第1インク供給モ

ードから第2インク供給モードに切り換えるに当たっては、モード切換部材80の先端に位置するレバー89を引き上げて引掛孔82からロック爪20bを外して、引掛孔84にロック爪20bを引っ掛ける。

【0050】第2インク供給モードでは、圧縮コイルばね90がモード切換部材80を押し上げるので、モード切換部材80が上方に（矢印B方向に）回動して第1インク供給モードのときに比べて高い位置に位置する。この高い位置が、本発明にいう第2の位置の一例である。また、第2インク供給モードでは、ジョイント針86はジョイントシールド70dから抜け出てインクカートリッジ70の生インク室70aから離れる。さらに、第2インク供給モードでは、連通孔70cを密閉していたシール材88も連通孔70cから離れ、これにより、スポンジ室70bの気密状態が解除されてスポンジ室70bが外部に連通する。

【0051】上述したように、モード切換部材80が上方に回動するので、図10に示すように、インク供給チューブ64はフック66とモード選択部材80に挟まれた空間で押し潰される（挟み込まれる）。この挟み込み量は、インク供給チューブ64の内径分を潰す程度であり、インク供給チューブ64の肉厚部は特につぶさないような量に設定されている。

【0052】第2インク供給モードでは、ジョイント針86を生インク室70aから離すと共に連通孔70cを開放させ、さらに、インク供給チューブ64をインクが通らないように押し潰す。このため、モードの切換えと共に、ジョイント針86まで充滿しているインク供給チューブ64内のインクがインクボトル側に逆流することを防止できる。従って、一度の操作で2工程の操作が同時に行われることとなる。

【0053】キャリッジ22から印字ヘッド20を取り外す操作について説明する。

【0054】モード切換部材80を、第2インク供給モードのときの位置よりも上方（矢印B方向）の位置（本発明にいう第3の位置の一例である）まで回動させる。この回動によって、インク供給チューブ64の挟み込み状態を維持しながらチューブガイド64aがフック66を押し付ける。これにより、図11に示すように、フック66も矢印B方向に回動する。フック66の下方には、印字ヘッド20の側面に接触するレバー66bが形成されており、このレバー66bが印字ヘッド20を押し出す。この結果、印字ヘッド20を固定しているフック66のロックが解除されてキャリッジ22から印字ヘッド20を取り外せると共に、インクカートリッジ70も取り外せることとなる。

【0055】図12から図18までを参照して、本発明のインクジェット方式画像形成装置の第2実施形態を説明する。

【0056】図12は、第2実施形態のインクジェット

方式画像形成装置においてインクボトルから印字ヘッドにインクを供給するインク供給モードを示す模式図である。図13は、図12のモードのときの印字ヘッドなどの外観を示す斜視図である。図14は、印字ヘッドと連結したジョイント台を示す斜視図である。図15は、ジョイント台の構成を示す断面図である。図16は、ジョイント台の構成を示す斜視図である。図17は、インクボトルからのインク供給を遮断したモードを示す模式図である。図18は、キャリッジから印字ヘッドを取り出せるモードを示す模式図である。これらの図では、図1から図11に示す構成要素と同一の構成要素には同一の符号が付されている。

【0057】図12に示すように、インクジェット方式画像形成装置100には、インクボトル（本発明にいう第1インク貯蔵部の一例であり、図21に示すインクボトル16と同様のものである。）が収納されたインクボトルケース62（図1参照）が側壁（図示せず）に固定されている。インクボトルケース62に収納されたインクボトルからインク供給チューブ102やインクカートリッジ110などを介して印字ヘッド20にインクが供給される。このようなインク供給モードを本発明では第1インク供給モードという。一方、インクボトルからのインクの供給を遮断して、インクカートリッジ110に貯蔵されているインクだけを印字ヘッド20に供給するインク供給モードを本発明では第2インク供給モード（「使い切りモード」）という。

【0058】インクジェット方式画像形成装置100の特徴は、第1インク供給モードから第2インク供給モードへの切換、もしくはこの逆の切換をワンタッチでできるモード切換部材120を備えた点にある。このモード切換部材120には、後述するジョイント台140が組み込まれている。また、上記したインクカートリッジ110は、インクが貯蔵されて印字ヘッド20に搭載されるものであり、モード切換部材120が係止されるような構造になっている。

【0059】図12や図17に示すように、キャリッジ22には印字ヘッド20が搭載される。キャリッジ22には、印字ヘッド20をこのキャリッジ22に固定するためのフック66（本発明にいう固定部材の一例である）が形成されており、キャリッジ22に搭載された印字ヘッド20はフック66によってキャリッジ22に固定される。

【0060】フック66には、上記のモード切換部材120の一端部120aが回転軸66aによって回転自在に固定されている。モード切換部材120の他端部120bには、引掛孔122が形成されている。この引掛孔122に嵌り込んで引っ掛かるロック爪20bが印字ヘッド20に形成されている。引掛孔122にロック爪20bが引っ掛かると第1インク供給モードとなり、インクボトルケース62に収納されたインクボトルからイン

ク供給チューブ102やインクカートリッジ110などを介して印字ヘッド20にインクが供給される。一方、引掛孔122からロック爪20bが外れると第2インク供給モードとなり、インクボトルケース62に収納されたインクボトルからのインク供給が遮断されてインクカートリッジ110だけから印字ヘッド20にインクが供給される。

【0061】引掛孔122にロック爪20bが引っ掛かるようなモード切換部材120の位置が、本発明にいう第1の位置の一例である。引掛孔122からロック爪20bが外れるようなモード切換部材120の位置が、本発明にいう第2の位置の一例である。また、図18に示すように、モード切換部材120を上方（矢印B方向）に回動させると、フック66の固定が外れて印字ヘッド20をキャリッジ22から取り外せる。モード切換部材120が上方に回動したときの位置は、本発明にいう第3の位置の一例である。

【0062】上述したモード切換部材120や印字ヘッド20についてさらに詳細に説明する。

【0063】図12や図14などに示すように、インクカートリッジ110は、インクを液体の状態で貯蔵しておく生インク室110aと、スポンジにインクを吸収させた状態で貯蔵しておくスポンジ110bとに仕切られているが、仕切壁の下部には開口が形成されている。生インク室110aに貯蔵されているインクは、印字ヘッド20の吐出パルスに起因して生じる負圧力によって、開口を通してスポンジ室110bに引き込まれる。

【0064】スポンジ室110bの上方には、このスポンジ室110bを大気と連通させる連通孔110cが形成されている。連通孔110cは、インクカートリッジ110の内部が最適な負圧状態になるような形状・寸法で形成されている。

【0065】生インク室110aの上部には、ジョイント台140に連結される連結部112が形成されている。この連結部112には、生インク室110aに連通するインク流路112aが形成されている。インク流路112aの開口には、後述するジョイント針142（本発明にいう流路形成部材の一例である）が差し込まれるジョイントシールド112bで塞がれている。ジョイントシールド112bは1ミリ程度の厚さのゴム材である。ジョイントシールド112bはジョイント針142によって突き破られて孔が開くが、この孔は、ジョイント針142が差し込まれた状態ではゴムの弾性収縮によって塞がれる。

【0066】上述したようにフック66はキャリッジ22に回転自在に固定されている。このフック66には、ばね68によって印字ヘッド20を固定する方向に回転力が与えられている。従って、印字ヘッド20はフック66により加圧されて固定されていることとなる。

【0067】図16に示すように、円筒状のジョイント

台140の内部には、長手方向（ジョイント台140の高さ方向）に沿ってジョイント針142（本発明にいう流路形成部材の一例である）が固定されている。ジョイント針142の先端部には、インクが流れ出る多数の孔142aが形成されている。ジョイント針142の後端部はインク供給チューブ102に接続されている。

【0068】また、ジョイント台140の長さ方向の3分の2の位置には固定壁144が形成されている。この固定壁144よりもジョイント針142の先端部側は、円柱状の空洞になっている。この空洞には圧縮コイルばね146が挿入されており、その後端部は固定壁144に当接している。また、圧縮コイルばね146の先端部には、ジョイント台140の空洞の内部にぴったりと嵌め込まれた円筒状のスライダ148が当接している。このスライダ148の内部にはスポンジ材150が詰め込まれている。このため、スポンジ材150の外周面がスライダ148で覆われたようになっている。スライダ148は、ジョイント台140に対する摩擦係数の低い材料で製造されている。スライダ148の長さ（高さ）は、ジョイント台140の空洞の長さの4分の1程度である。

【0069】スポンジ材148の中央部にはその長手方向に沿って、ジョイント針142の外径よりもやや小さい孔が形成されている。この孔にジョイント針142が差し込まれている。

【0070】上記したスライダ148は、圧縮コイルばね146のばね力（付勢力）によってジョイント台140の開口140aに向けて付勢されている。この開口140aには、スライダ148が抜け落ちないようにストッパ140bが形成されている。スライダ148が開口140aの近くに位置しているときは、スポンジ材150がジョイント針142の先端部を覆っており、このため、ジョイント針142の孔142aはスポンジ材150で塞がれている。

【0071】一方、圧縮コイルばね146を縮めるような力がスライダ148に作用した場合、スライダ148はスポンジ材150と共にジョイント台140の奥に移動する。これにより、ジョイント針142の孔142aが露出する。なお、ジョイント針142は、内径1ミリ以下に中空成型されている。また、ジョイント針142の先端部に形成された孔142aからはインクが流れ出る。

【0072】モード切換部材120の上端部120aの近傍の下面には、インクカートリッジ110の連通孔110cを塞いで密閉するシール材124が固定されている。モード切換部材120の引掛孔122に印字ヘッド20のロック爪20bを引っ掛けた状態では、図12に示すように、シール材124が連通孔110cを密閉する。

【0073】上記した第1インク供給モードについて説

明する。

【0074】上述したように第1インク供給モードでは、インクボトルケース62に収納されたインクボトルからインク供給チューブ102やインクカートリッジ110などを介して印字ヘッド20にインクが供給される。この第1インク供給モードでは、図17に示すように、引掛孔122にロック爪20bが引っ掛けられる。この場合、ジョイント台140が連結部112に突き当たって、圧縮コイルばね146を縮めるような力がスライダ148に作用し、スライダ148はスポンジ材150と共にジョイント台140の奥に移動する。これにより、ジョイント針142の孔142aが連結部112のインク流路112a内で露出し、インクボトルと生インク室110aがつながる。

【0075】なお、この状態では、ジョイント台140の先端部に形成されたロックレバー152（図14参照）が、モード切換部材120に形成されたストッパ126に突き当たって固定される。また、連通孔110cがシール材124で密閉されてインクカートリッジ110の内部が最適な負圧状態に保たれ、インクが供給されることとなる。

【0076】上記した第2インク供給モードについて説明する。

【0077】上述したように、第2インク供給モードでは、インクボトルからのインクの供給が遮断されて、インクカートリッジ110に貯蔵されているインクだけが印字ヘッド20に供給される。この第2インク供給モードは「使い切りモード」とも呼ばれる。第1インク供給モードから第2インク供給モードに切り換えるに当たっては、モード切換部材120の先端に位置するレバー128を引き上げて引掛孔122からロック爪20bを外す。これにより、ジョイント台140のロックレバー152が押し下げられて、圧縮コイルばね146の付勢力によってジョイント台140が連結部112から離れる方向に移動する。

【0078】この移動によって、連通孔110cの密閉状態が解除されてスポンジ室110bが大気に連通する。また、ジョイント針142はシール材112bから抜け出て、ジョイント針142の孔142aがスポンジ材150で塞がれる。従って、このような状態のときは、インクボトルからのインク供給が遮断される。また、ジョイント針142の孔142aがスポンジ材150により塞がれるので、インク供給チューブ102内部におけるインクボトルからジョイント針142までのインクがインクボトルに逆流しない。

【0079】キャリッジ22から印字ヘッド20を取り外す操作について説明する。

【0080】モード切換部材120のレバー128を高く引き上げて、モード切換部材120を回転軸66aを中心軸にして回転させる。この回転によって、図18に

示すように、フック66も回転軸66aを中心にして矢印B方向に回転する。フック66の下方には、印字ヘッド20の側面に接触するレバー66cが形成されており、このレバー66cが印字ヘッド20を押し出す。この結果、印字ヘッド20を固定しているフック66のロックが解除されてキャリッジ22から印字ヘッド20を取り外せると共に、インクカートリッジ110も取り外せることとなる。

【0081】上述した第1及び第2実施形態では、第1インク供給モードもしくは第2インク供給モードに切り換える際に、モード切換部材80、120をユーザが手で移動させる。このモード切換部材80、120を自動的に移動できる自動切換機構および制御器（制御装置）をインクジェット方式画像形成装置に組み込んだ場合は、インクボトル16に貯蔵されているインクの残量を担持する残量インク検知信号に基づいて、インクジェット方式画像形成装置が自動的に連結部材を移動させて第1インク供給モードから第2インク供給モード（使い切りモード）に切り換えられる。このため、画像印字中でも印字動作を中断せずに、また、操作者が切換え操作を行わなくても良い。従って、インクボトル16のインク切れを気にすることなく、印字動作が継続できるので操作性が向上し、使い勝手の良いインクジェット方式画像形成装置が得られる。

#### 【0082】

【発明の効果】以上説明したように本発明のインクジェット方式画像形成装置では、モード選択部材を第1の位置から第2の位置に移動させることにより第1インク供給モードから第2インク供給モードに切り換えられるので、この切換えを容易にしかも確実に実行できる。また、モード選択部材が固定部材に取り付けられているので、これらを別々に配置する場合に比べて簡易な構成となる。

【0083】ここで、前記モード選択部材は、前記第1及び第2の位置とは異なる第3の位置に位置したときに、前記固定部材によって前記キャリッジに固定された前記印字ヘッドの固定を解除するものである場合は、モード選択部材を第3の位置に位置させることにより印字ヘッドの固定が解除されるので、印字ヘッドを容易に交換できることとなる。

【0084】また、前記チューブは、前記固定部材と前記モード選択部材に挟まれた空間を通過するものであり、前記モード選択部材は、該モード選択部材が前記第1の位置に位置するときには前記チューブを押し潰さずに該チューブ内をインクが流れるようにするものであり、該モード選択部材が前記第2の位置に位置するときには前記チューブを押し潰して該チューブ内をインクが流れないようにするものである場合は、モード選択部材を第2の位置に位置させることによりチューブ内をインクが流れないので、インクが第1インク貯蔵部に逆流することを防止できる。

【0085】さらに、前記モード選択部材が前記第1の位置に位置するときには前記第2インク貯蔵部に接続されて該第2インク貯蔵部にインクを流し出し、前記モード選択部材が前記第2の位置に位置するときには前記第2インク貯蔵部から離れる、前記チューブの端部に接続された流路形成部材をインクジェット方式画像形成装置に備えた場合は、モード選択部材が第2の位置に位置するときは流路形成部材が第2インク貯蔵部から離れるので、いっそう確実に第2インク供給モードに切り換えられる。

【0086】さらにまた、前記流路形成部材は、インクが流れ出る開口が形成されたものであり、前記モード選択部材が前記第2の位置に位置するときには前記開口を密閉する密閉部材をインクジェット方式画像形成装置に備えた場合は、密閉部材が流路形成部材の開口を密閉するので、この開口からインクが不用意に漏れることがない。

【0087】さらにまた、前記第1及び第2インク供給モードに応じて前記流路形成部材の前記開口が開閉されるように該流路形成部材を制御する制御器をインクジェット方式画像形成装置に備えた場合は、制御器によって流路形成部材の開口が開閉されるので、インクジェット方式画像形成装置のユーザが切換え操作を行わなくてもよい。従って、第1インク貯蔵部のインク切れを気にすることなく、印字動作が継続できるので操作性が向上し、使い勝手の良いインクジェット方式画像形成装置が得られる。

#### 【図面の簡単な説明】

【図1】本発明の第1実施形態のインクジェット方式画像形成装置の外観を示す斜視図である。

【図2】図1のインクジェット方式画像形成装置の内部構成を示す模式図である。

【図3】図2の印字ヘッドの外観を示す斜視図である。

【図4】図3の印字ヘッドがキャリッジに固定された固定状態を示す模式図である。

【図5】インクボトルから印字ヘッドにインクを供給するインク供給状態を示す模式図である。

【図6】第1インク供給モードを示す斜視図である。

【図7】インクボトルからインクを供給できる状態（第1インク供給モード）のチューブを示す模式図である。

【図8】第2インク供給モードを示す斜視図である。

【図9】第2インク供給モードを示す模式図である。

【図10】インクボトルからのインクの供給が遮断された状態（第2インク供給モード）のチューブを示す模式図である。

【図11】モード選択部材が第3の位置に位置して印字ヘッドを取り外せる状態を示す模式図である。

【図12】本発明の第2実施形態のインクジェット方式画像形成装置においてインクボトルから印字ヘッドにインクを供給するインク供給モードを示す模式図である。

【図13】図12のモードのときの印字ヘッドなどの外観を示す斜視図である。

【図14】印字ヘッドと連結したジョイント台を示す斜視図である。

【図15】ジョイント台の構成を示す断面図である。

【図16】ジョイント台の構成を示す斜視図である。

【図17】インクボトルからのインク供給を遮断したモードを示す模式図である。

【図18】キャリッジから印字ヘッドを取り出せるモードを示す模式図である。

【図19】従来のインクジェット方式画像形成装置の一例であるインクジェットプリンタを示す斜視図である。

【図20】図19のインクジェットプリンタの内部構造を示す模式図である。

【図21】チューピング方式を示す模式図である。

【図22】針ユニットが取り付けられたインクカートリ

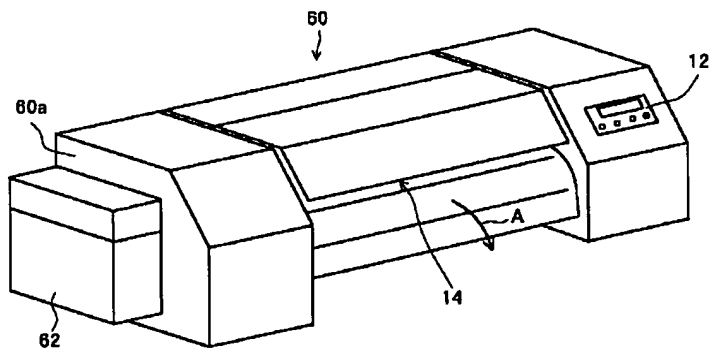
ッジを示す模式図である。

【図23】針ユニットが取り外されたインクカートリッジを示す模式図である。

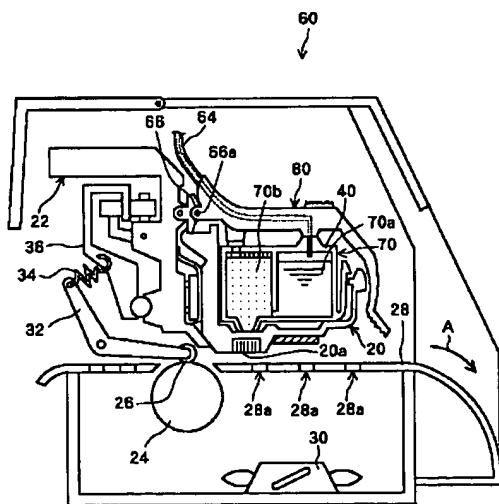
【符号の説明】

- 16 インクボトル
- 20 印字ヘッド
- 20b ロック爪
- 22 キャリッジ
- 60, 100 インクジェット方式画像形成装置
- 64, 102 インク供給チューブ
- 66 フック
- 70, 110 インクカートリッジ
- 80, 120 モード切換部材
- 82, 84, 122 引掛孔
- 86 ジョイント針

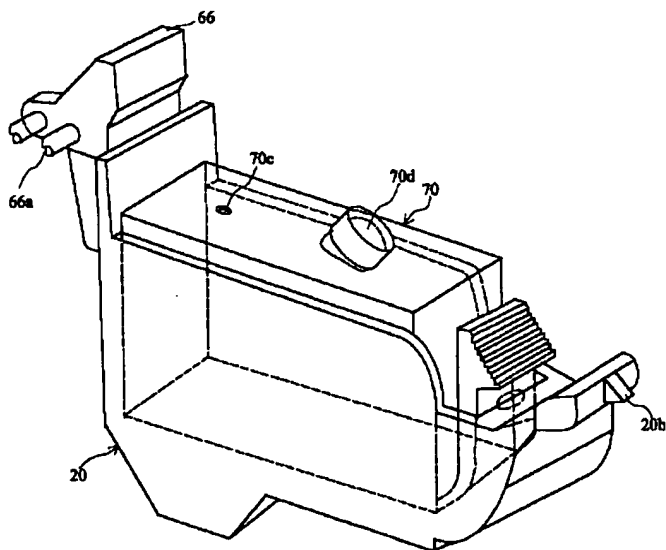
【図1】



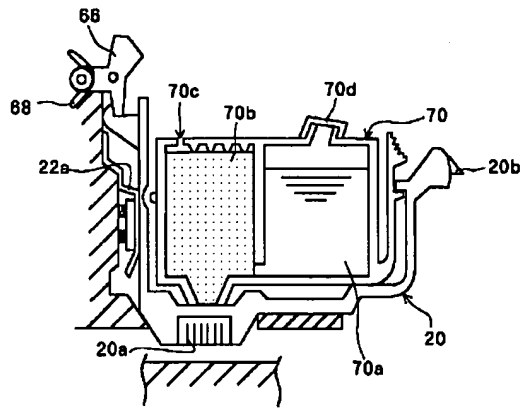
【図2】



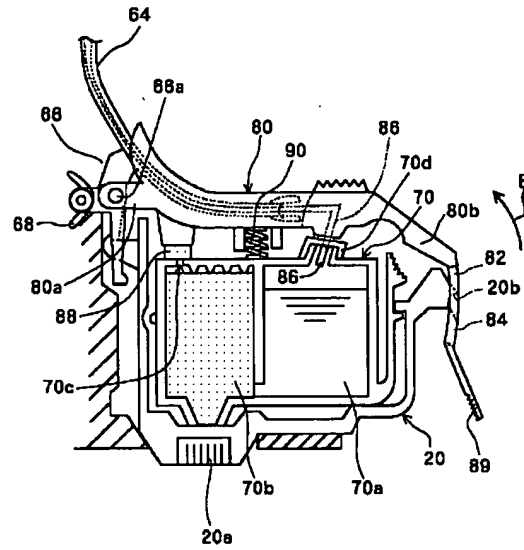
【図3】



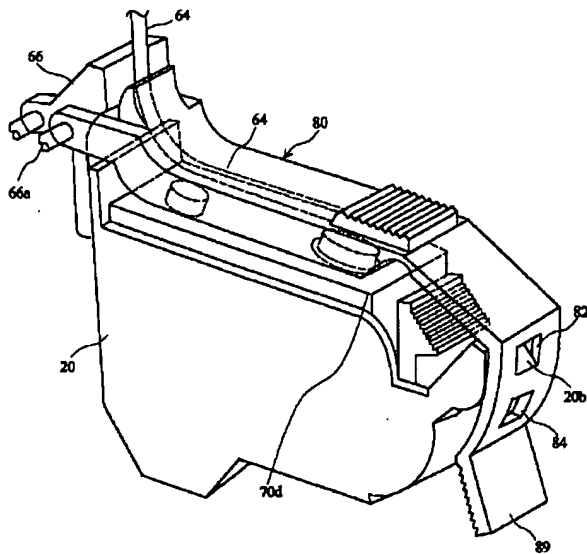
【図 4】



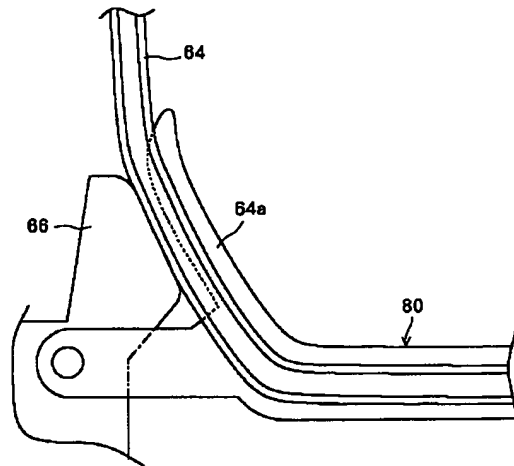
【図 5】



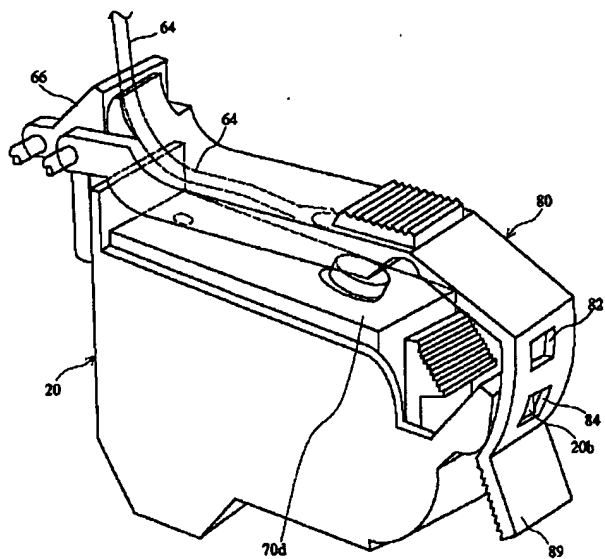
【図 6】



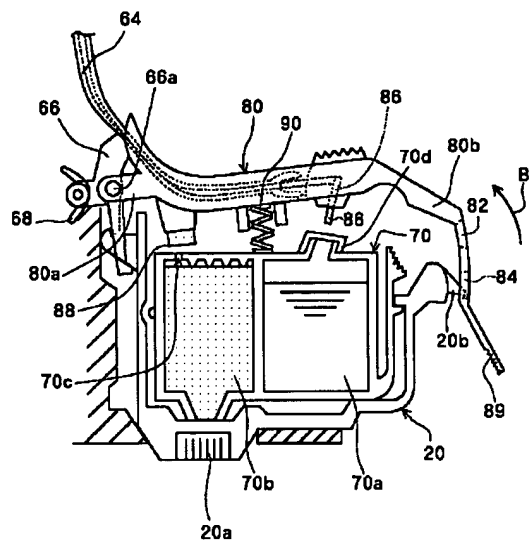
【図 7】



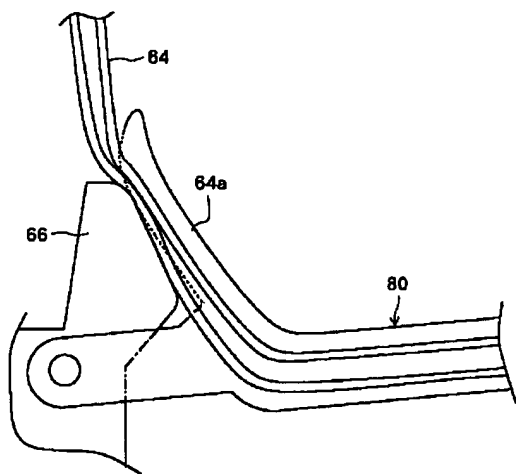
【図8】



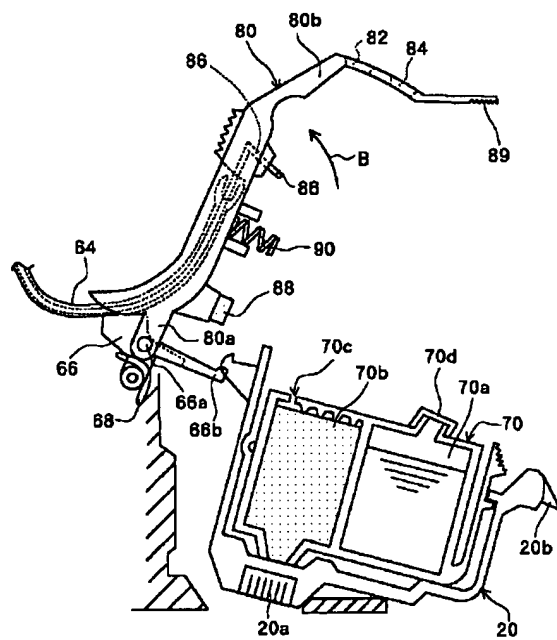
【図9】



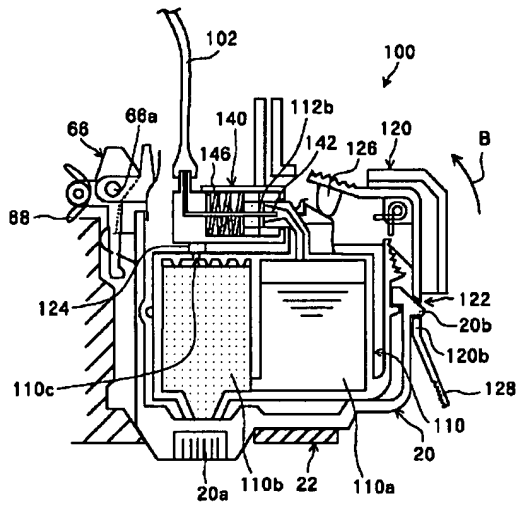
【図10】



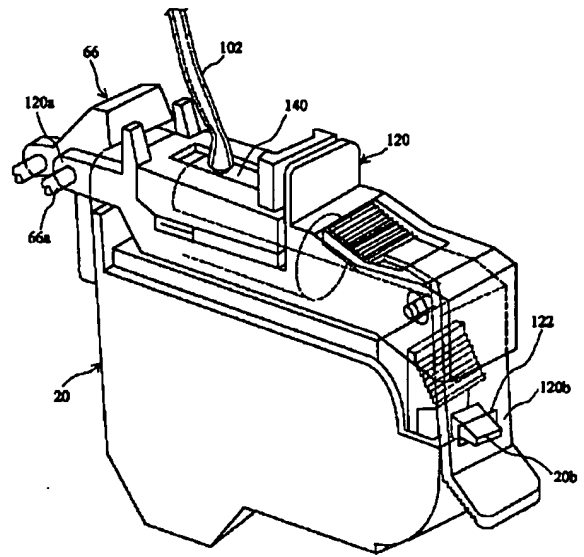
【図11】



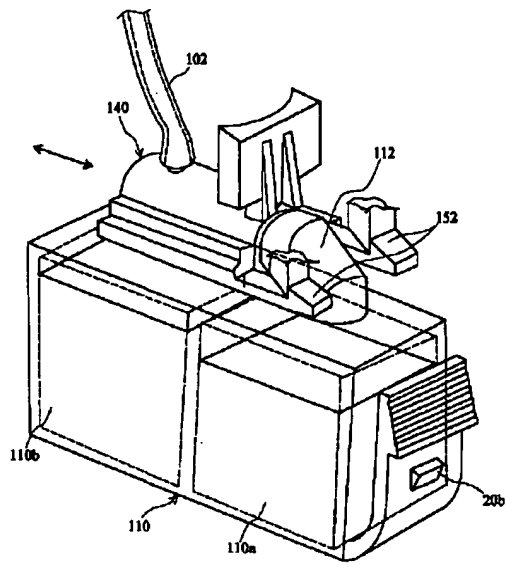
【図12】



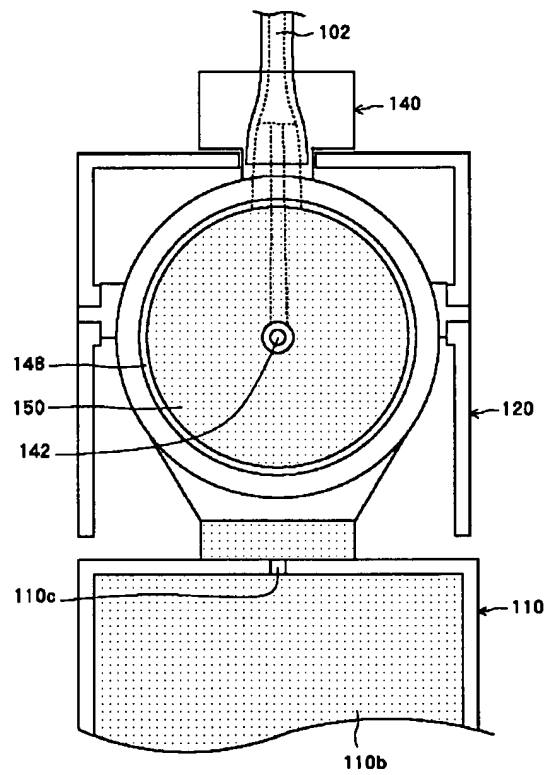
【図13】



【図14】

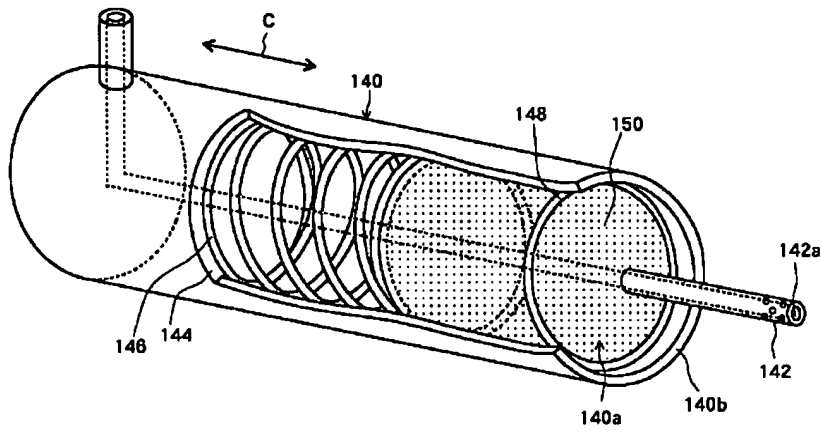


【図15】

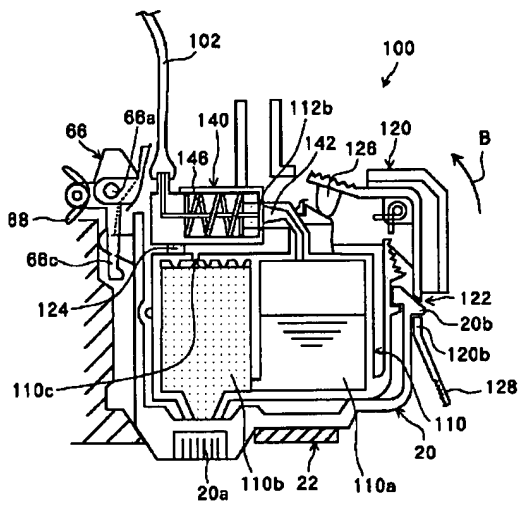




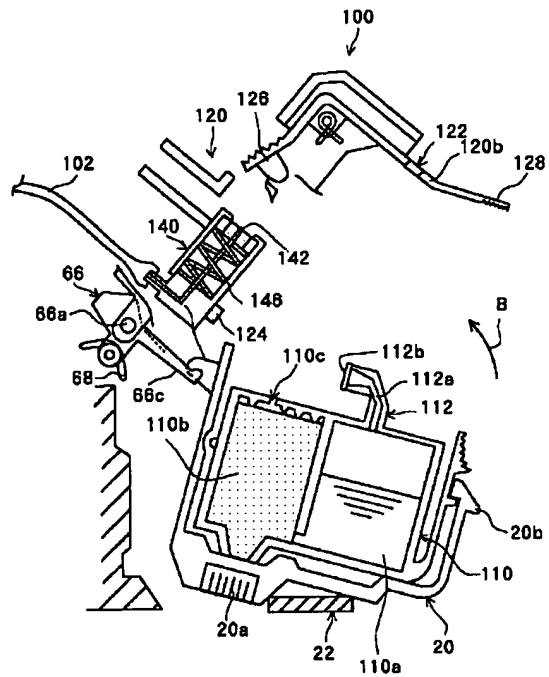
【図16】



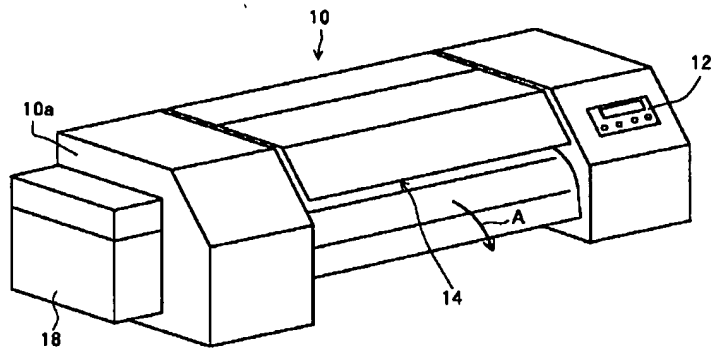
【図17】



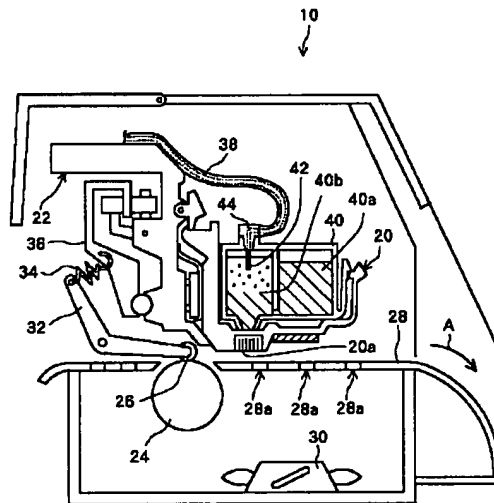
【図18】



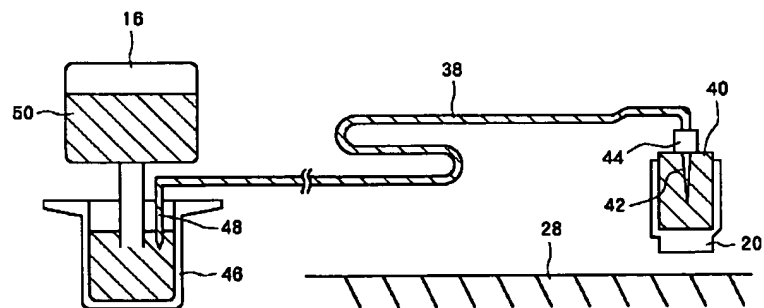
【図19】



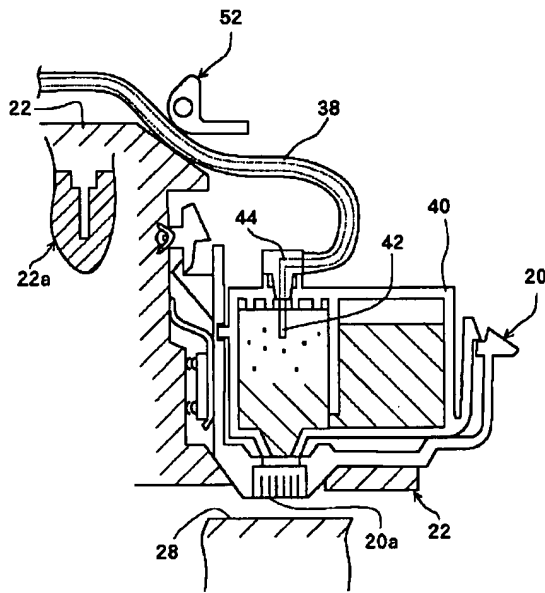
【図20】



【図21】



【図 2 2】



【図 2 3】

